Chapter 2. Digitalisation, business models and value creation

This chapter considers the impact of digitalisation on business models and value creation. It describes the main features of digital markets and how these shape value creation, looking in particular at more highly digitalised business models. Three characteristics that are frequently observed in certain highly digitalised business models are identified.

2.1. Overview

30. Technological advances have brought about a rapid decline in the unit cost of data processing, leading to dramatic increases in the use of digital information which can be manipulated at high speeds and low marginal costs. This change has facilitated the adoption and integration of digital products and transactions, inducing an ongoing, structural transformation of the economy.

31. This chapter presents an in-depth analysis of value creation across different digitalised business models, with the aim of informing the current debate about international taxation. Section 2 describes the main characteristics of digital markets. Such characteristics shape the three different processes of value creation identified in Section 3 (value chain, value network and value shop) and analysed in detail in Section 4 through business case studies. Section 5 identifies three key factors that are prevalent in more highly digitalised businesses and it accounts for the related differing views of the members of the Inclusive Framework on BEPS. Section 5 lays the groundwork for the discussion in Chapter 5 on the implications of digitalisation for the international tax framework.

32. It emerges that the structure of businesses and the process of value creation have significantly evolved, especially for some enterprises. In attempting to understand these changes, it is important to highlight a number of the most salient, common characteristics of digitalised businesses. These characteristics, which will become common features of an even wider number of businesses as digitalisation continues, include: cross-jurisdictional scale without mass; the heavy reliance on intangible assets, especially intellectual property (IP); and the importance of data, user participation and their synergies with IP.

33. **Cross-jurisdictional scale without mass**. Digitalisation has allowed businesses in many sectors to locate various stages of their production processes across different countries, and at the same time access a greater number of customers around the globe. Digitalisation also allows some highly digitalised enterprises to be heavily involved in the economic life of a jurisdiction without any, or any significant, physical presence, thus achieving operational local scale without local mass (referred to as “scale without mass,” hereafter).

34. **Reliance on intangible assets, including IP.** The analysis also shows that digitalised enterprises are characterised by the growing importance of investment in intangibles, especially IP assets which could either be owned by the business or leased from a third party. For many digitalised enterprises, the intense use of IP assets such as software and algorithms supporting their platforms, websites and many other crucial functions are central to their business models.

35. **Data, user participation and their synergies with IP**. Data, user participation, network effects and the provision of user-generated content are commonly observed in the business models of more highly digitalised businesses. The benefits from data analysis are also likely to increase with the amount of collected information linked to a specific user or customer. The important role that user participation can play is seen in the case of social networks, where without data, network effects and user-generated content, the businesses would not exist as we know them today. In addition, the degree of user participation can be broadly divided into two categories: active and passive user participation. However, the degree of user participation does not necessarily correlate

with the degree of digitalisation: for example, cloud computing can be considered as a more highly digitalised business that involves only limited user participation.

36. **Relationship between digitalised business models and value creation**. Among members of the Inclusive Framework, the existence of these three frequently observed characteristics of digitalised businesses is generally acknowledged but there is no consensus on their relevance and importance to the location of value creation and the identity of the value creator. There is general agreement that cross-jurisdictional scale without mass and the increased reliance on intangible assets can be highly relevant to the value creation of digitalised businesses, however, there is also agreement that these factors are not exclusive or unique to digitalised businesses.

37. While there is general agreement that data and user participation are common characteristics of digitalised businesses, there are differences of opinion on whether and the extent to which data and user participation represent a contribution to value creation by the enterprise. For some members of the Inclusive Framework, the role of user participation is seen as a unique and important driver of value creation in digitalised businesses. These countries point to the participation and sustained engagement of users which allows digital businesses to collect large amounts of data through the intensive monitoring of users' active contributions and behaviour. These countries also point to the contribution of content by users, which can be central to a digital business' offering and central to attracting other users and generating network effects.

38. These countries also take the view that user participation (e.g., reviews, provision of services) can play an important role in building up the trust and reputation of certain digital businesses and contributing to their brand and the growth of user networks. For example, these countries would consider that in some business models the collection through a digital platform of data and content contributions from users in a jurisdiction and the use of that data to attract other users to the platform and to direct advertising back at the users, are activities integral to the creation of value by the business that effectively take place in that jurisdiction, even if the platform is operated remotely. For these countries, user participation may create value for the digital business. Users employ specific business models to interact with each other. For example, the provision of content accessible by other users increases the platform's utility and value. In the past, such content had either to be produced or bought by the relevant businesses. For these countries, user contribution is something genuinely new and goes beyond the mere consumption of a service (i.e., the provision of access to the business model).

39. In contrast, there are countries that view data collection from users, user participation, and the provision of user generated content as transactions between the users (as providers of data/content) and the digitalised business, with the digitalised business providing financial or non-financial compensation to the users in exchange for such data/content. That non-financial compensation could come in the form of providing, for example, data hosting, email services, or digital entertainment. Countries that support this view agree that the interaction between users and the digitalised business is a transaction that could be subject to income taxation, although they also observe that income tax systems today rarely capture these types of barter transactions where there is no financial compensation (i.e., cash payment) on either side of the transaction. These countries do not agree that the action by the digitalised business to source data from users is an activity to which profit should be attributed to the digitalised business solely because the data acquired may be valuable. In this sense, the user's supply of data would not be different from other business inputs sourced from an independent third party in the

business' supply chain (for example, data storage, broadband access, electricity). Nonetheless, some of these countries are of the view that user data may be recognised as contributing to valuable intangible assets of digitalised businesses and in that sense, may be considered as giving rise to the broader challenges identified above in relation to intangibles. However, there are other countries who do not view the provision of user generated content or the interactions between users and the digitalised businesses as barter transactions between users and digitalised businesses.

40. Differences in views over whether and the extent to which data and user participation contribute to value creation will have an impact on whether there are considered to be tax challenges arising from changing business models, whether those are unique to the application of international tax rules to digitalised firms, or whether any challenges apply to the international tax rules more broadly. Additionally, since the degree of user participation may not closely correlate with the degree of digitalisation, a pure focus on data and user participation without reference to other characterising factors may imply that the tax challenges affect only a specific, more limited group of digitalised businesses.[1] In this context, further work may be needed to assess whether the different views can be reconciled in order to reach consensus on the extent of the long term tax challenges and, in turn, how long term solutions could be developed. The tax implications of the analysis set out in this chapter on digitalisation, business models and value creation, are considered in more detail in Chapter 5.

2.2. The infrastructure of the digitalising economy

41. Before investigating the value creation process, it is useful to lay down the main characteristics of digital markets, i.e., the infrastructure on which digitalised businesses develop. The objective of this section is to establish a wide-ranging understanding of the market dynamics of the digitalisation of the economy before any discussion of the implications of digitalisation for the tax system. This is important for a better grasp of the broader effects of any tax measures considered later in the report and because the characteristics of digital markets shape the process of value creation described in Sections 3 and 4 of this chapter. One difficulty with describing a multitude of relevant features of digital markets and of digitalised business models is to present them in a comprehensive but concise way. In line with this aim, this section adopts a classification of business models/lines derived from the literature (Hagiu and Wright, 2015a).

42. The economic impact of digitalisation has been the subject of an increasing amount of theoretical and empirical research since at least the early 2000s.[2] This economic literature often builds on the analysis of markets understood as offline or online places where two (or more) parties exchange goods or services. Digital (or online) markets are distinct from offline markets in so far as they are characterised by an exacerbation of certain features which are, however, not exclusive to them. Although the language and focus of the analyses often vary, there is widespread consensus on the defining characteristics of digital markets:

- Direct network effects: In digital markets, utility from the consumption of a specific good or service is often dependent on the number of other end-users consuming the same good or service. This effect is called a *direct* network externality, sometimes also referred to as a direct network effect or consumption externality; it is a positive externality in that the larger the network, the larger the end-user utility. The most obvious examples are social media and online messaging services. Both applications are practically useless to the user if he or

she is the only person using them, however, their value increases as the number of other users increases. The effect is also apparent, for instance, in the case of online gaming or operating systems.

- Indirect network effects: In contrast to direct network effects, *indirect* network effects arise in the context of multi-sided markets. As will be discussed in more detail below, they occur when a specific group of end-users (e.g., users of a social network) benefit from interacting with another group of end-users (e.g., advertisers on a social network), for instance, via an online platform. Digitalisation has allowed the emergence of online platforms and networks, and we have seen an increasing number of platform-based businesses in many different sectors such as, for example, accommodation rental, transportation or peer-to-peer e-commerce.
- Economies of scale: In many cases the production of digital goods and services entails relatively higher fixed costs and lower variable costs. Software development, for instance, requires considerable investments in infrastructure and human labour; however, once the final programme has been developed it can be maintained, sold or distributed at very low marginal costs. While in many cases marginal costs will remain non-negligible, there are also a range of non-rival consumption goods,[3] such as software, e-books or music, which can be reproduced at an effective marginal cost of zero.
- Switching costs and lock-in effects: Digital transactions can be carried out on different electronic devices; however, end-user devices often rely on different operating systems. As a result, customers may be locked-in to a particular operating system once they have acquired a specific device. This effect is due to psychological as well as monetary switching costs which end-users have to incur in order to switch from one system to another. Again, social media or email services provide a good example as a change from one application to another entails the transfer of a wide range of personal data and contacts; another example would be a change from a specific smartphone (including operating system) to another, implying a loss in access to previously accumulated applications and data.
- Complementarity: Many of the goods and services traded in digital markets are complements; that is to say, customers derive more utility from consuming two (or more) complementary goods together. For instance, utility from using a laptop or smartphone is greatly increased when it is used together with corresponding software programmes, e.g., operating systems, applications or games. Similarly, utility from spending time on a social media platform is increased when the user also has a smartphone with a range of applications allowing him or her to share more content.

43. These characteristics can be used to describe specific aspects of digital or non-digital markets; as such, they are not exclusive to the digitalised economy. However, the ongoing shift towards digital products and transactions has greatly magnified their relevance and, owing to the fact that they mutually reinforce each other, they have led to a structural transformation of the economy (OECD, forthcoming).

44. In particular, low marginal costs and the global reach of the Internet allow digitalised businesses to quickly increase their scale in operations. Direct and indirect network effects increase the value created by digitalised businesses since larger user bases directly translate into increases in utility and, thus, also economic value. In addition, complementarities between different business lines, for example, in the

development of various end-user devices, operating systems and applications, give rise to economies of scope. As common development costs can be shared across business lines and applications can be streamlined to reduce the cognitive cost to users, digitalised businesses can achieve competitive advantages by expanding their range of activities. Such advantages can become persistent as users are reluctant to incur the costs associated with switching between devices, operating systems and applications.

45. As a result, digital markets are often not competitive in the sense that single firms become large enough to influence market prices (i.e., they are not price-takers). On the one hand, this implies that it may be more difficult for new firms to gain significant market shares if an incumbent firm already dominates the market (OECD, 2015b). On the other hand, low marginal costs and non-rivalry of many digital goods also imply that new entrants can replace an incumbent firm in relatively short time simply by offering a qualitatively superior good. Once a critical mass of end-users has switched to the new product, it becomes possible for the formerly dominant firm to lose its entire market share within a short time span. This has been the case, for instance, with search engines, web browsers and social media platforms (Evans, 2011).

46. The impacts of this digital transformation are further amplified through the fact that digitalisation has also led to an acceleration of economic activities. In the digital space, transactions between end-users in different jurisdictions can be concluded without loss of time and digital content can be accessed immediately from any device connected to the Internet. As a result, digital products and services disseminate faster, markets clear faster, ideas circulate faster and it becomes much easier for businesses to identify, engage and develop their customer bases. This increase in the speed of economic activity implies that businesses can gain significant competitive advantages by being the first to move into, and potentially dominate, a new market.[4]

47. Taken together, these structural changes brought about by digitalisation are transforming the economy, leading to the emergence of new business models and to the substantial transformations of old ones. In particular, the concepts of indirect network effects and multi-sided markets are crucial for understanding the success of several of the most innovative digitalised businesses. The following two subsections therefore discuss these concepts in more detail, providing a first assessment of how they have impacted business models.

2.2.1. Digital multi-sided markets

48. Like offline markets, digital or online markets can be single- or multi-sided. In single-sided markets, sellers engage with only one specific set of customers, e.g., a reader buying a book in a book shop. In multi-sided markets, there are more than one set of customers acquiring different products and services from a company. Multi-sided markets have existed before, for example in the form of television where advertisements are displayed to an audience and newspapers also presenting advertisements to a readership. Nonetheless, the digitalisation of the economy has facilitated the emergence of new enterprises rooted in multi-sided markets.

49. In particular, digitalisation has greatly reduced communication costs, allowing businesses to quickly reach a global base of suppliers, users or customers and to establish user networks across different jurisdictions through websites, online platforms and mobile applications. New digitalised businesses often function as intermediaries linking different user groups which would otherwise find it difficult to interact directly in an offline (or non-digital) environment. Being able to create such networks and enable cross-

jurisdictional exchanges between various end-user groups is at the heart of multi-sided markets and has enormous potential for value creation. Economic analysis has introduced the concept of multi-sided markets to study some of the new, digitalised business models that have begun leveraging off the ability to create vast networks (Rochet and Tirole, 2003, 2006; Ellison and Fudenberg, 2003; Armstrong, 2006).

50. Multi-sided markets are defined by the joint presence of two characteristics: *indirect* network externalities and *non-neutral pricing* strategies. Indirect network effects occur when an increase in end-users on one side of the market increases the utility of end-users on another market side. Take the example of an online platform which helps individuals to rent accommodation by linking hosts and guests. Both types of end-users, hosts and guests, indirectly benefit if there are more end-users on the other side of the market: guests benefit from having more hosts to choose from and hosts benefit from having more guests.

51. As illustrated by this example, the online platform plays a crucial role in facilitating exchange and bringing together the two sides of the market (e.g., hosts and guests); without it, most of the transactions would not have taken place and guests would probably have booked more traditional accommodation.

52. As seen from this perspective, online platforms essentially provide intermediation services across the different sides of a digital market (Caillaud and Jullien, 2003; Rosenblatt and Stark, 2016) and may differ according to the degree of control over their users (Aslam and Shah, 2017). The economic success of digitalised business models relying on the intermediation between different groups of end-users depends crucially on reaching a critical mass of end-users on either side of the market. In this regard, the Internet has allowed digitalised businesses to reach a large number of participants on both sides of the market. A key feature allowing online multi-sided platforms to reach considerable scale has been their ability to adapt their price structures by levying different membership and usage fees on each side of the market (Lambrecht et al., 2014).

53. This leads the discussion to the second characteristic of multi-sided markets: the non-neutral pricing structure. As Rochet and Tirole (2003, 2006) have shown, the prevalence of positive indirect externalities implies that the firm operating the platform can reap benefits over and above the marginal utility of end-users, allowing them to increase the number of users (or transactions) by charging more on one side of the market while reducing the price for end-users on other sides. As a consequence, pricing structures are non-neutral in the sense that optimal prices can be below the marginal cost of provision on one market side while being above on the other side(s); end-users with lower price elasticities will typically be overcharged and vice versa.

54. This result also implies that it may be optimal for platform operators, depending on the magnitude of the indirect network externalities as well as on price elasticities, to provide goods or services free of charge to end-users on one (or potentially more) market sides. As a consequence, so-called *barter transactions* may arise, implying that goods or services are effectively traded, without monetary compensation, against other valuable inputs such as for example, user engagement, user data or user-generated content. Such a strategy is, for instance, adopted by many social networking platforms, email service or media providers. In these cases, end-users often benefit from "free" access to a specific service. However, platform operators typically compensate for this by extracting data from users and transactions and then by selling services based on that data to the other side of the market. The primary example is the sale of customers-targeted advertisements to advertisers on the other side of the market.

2.2.2. Emergence of new business models in digital markets

55. The previous subsections describe digital markets, i.e., the infrastructure on which different digitalised businesses operate. Subsection 2.2 focuses instead on the many different digitalised businesses that operate in such digital markets. To better understand how the emergence of single- and multi-sided digital markets have changed the value creation process, this section introduces the main economic characteristics of business models. Their process of value creation will be discussed in greater detail through the case studies in Section 4 and in Annex 2.A.

56. In the digitalisation of the economy, businesses interact with users through many different types of online or web-based interfaces, often called platforms in the press and in the literature. to avoid confusion and to align the definition with other OECD publications (OECD, forthcoming), this chapter uses the term "platform" only to refer to multi-sided platforms as defined here in accordance with Hagiu and Wright (2015a, 2015b).[5]

57. According to an earlier definition (Rochet and Tirole, 2003, 2006), a platform is referred to as multi-sided only if there are indirect network externalities affecting the price structures across market sides. Hagiu and Wright add two further requirements: (i) the platform allows for direct interactions between end-users on different market sides and (ii) end-users on each market side have to affiliate themselves with the platform (implying non-zero switching costs).

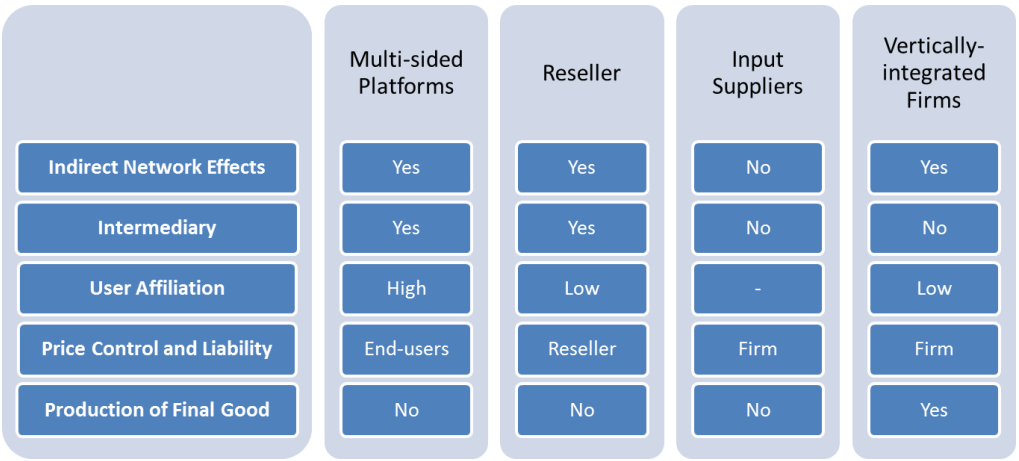
58. This stricter definition allows for a more precise differentiation between multi-sided platforms and other digitalised businesses. The authors discuss four stylised types of businesses operating in single- or multi-sided markets. For the classification to be effective, it is important to specify that it categorises business models or, differently said, business lines and not overall companies. For example, Amazon Marketplace belongs to one category while Amazon e-commerce belongs to another. Because of the economies of scope described above, it is often not possible to classify an entire company into a specific type as digitalised companies, and particularly the more established companies, frequently have more than one business line. Figure 1 summarises each type of business according to a range of criteria. Although all of them may use websites, applications or similar interfaces to sell their products and interact with customers, only the first group of businesses are multi-sided platforms in the strict sense defined in the previous paragraph.

- Multi-sided platforms: platforms that allow end-users to exchange and transact while leaving control rights[6] and liabilities[7] towards customers mostly with the supplier; end-users affiliate with the platform and interact across market sides so that indirect networks become crucial; e.g., Uber, Didi Chuxing, Airbnb, Xiaozhu, BlaBlaCar, Weibo, Amazon Marketplace, Taobao, Facebook, NetEase or Google, Deliveroo, Foodora, UberEATS.
- Resellers: businesses that acquire products, including control rights, from suppliers and resell them to buyers; resellers control prices and assume liability towards customers; they do not allow for the interaction of end-users and they do not necessarily require customers to affiliate to the online platform; e.g., Amazon e-commerce, Alibaba, JD.com, Spotify, Tencent's music distribution, or Netflix (where it purchases content).
- Vertically integrated firms: businesses that have acquired ownership over suppliers and have, thus, integrated the supply side of the market within their business; e.g., Amazon e-commerce (warehousing and logistics), Xiaomi (end-

user devices and applications), Huawei (hardware and cloud computing), Netflix (film production).

- Input suppliers: businesses or individuals supplying intermediary inputs required for a production process of goods or services in another firm. In contrast to multi-sided platforms, input suppliers are not intermediaries and interact only with the other firm and not with the final customer (e.g., Intel or Tsinghua Unigroup).

Figure 2.1. Characteristics of stylised digitalised business models



Source: OECD own research; based on Hagiu and Wright (2015a, 2015b).

59. Distinguishing between these stylised business models allows for a range of interesting observations which should lead to a better understanding of the dynamics of the digitalisation of the economy, including its implications for the tax system.

60. Digitalisation has been essential for the emergence of multi-sided platforms and input suppliers, whereas resellers and vertically-integrated firms have been standard organisational structures employed well before the digitalisation of the economy. An additional observation is that several of the larger digitalised companies started with one line of business that was a multi-sided platform and then gradually developed into more integrated or hybrid structures as they created additional business lines. In terms of market dynamics, traditional, vertically-integrated firms have sometimes been challenged by newly emerging multi-sided platforms suggesting that in some cases the latter may have comparative advantages over the former. This has been the case, for instance, in the transportation and accommodation sectors as traditional taxi and hotel businesses have been challenged by multi-sided platforms such as Uber, Didi Chuxing, Lyft, Expedia, Taobao, Airbnb and Booking.com.

61. The decision over whether or not to operate as a multi-sided platform can be understood as a strategic choice by businesses. As mentioned above, because of economies of scope, many digitalised companies combine different elements of the four stylised models or they use different models for different sectors of activity. For instance, the Alibaba and Amazon online stores operate as resellers for segments of the market where demand fluctuations are expected to be low, however, AliExpress and Amazon Marketplace are multi-sided platforms catering to market segments with more volatile demand. In this way, the risk of low demand remains with the seller and the multi-sided platform does not bear inventory risk. Similarly, music streaming businesses like Spotify and Deezer often operate two different business models: a free or "freemium"

subscription service that is entirely financed by advertisements (multi-sided platform) and a "premium" subscription service that is financed by a membership fee (reseller). Netflix, on the other hand, started out as a pure reseller but has now integrated film production into its business model.

62. The choice between the different business models, in particular multi-sided platforms and resellers, and hybrid combinations among them depends on business development strategies as well as other factors such as:

- Economies of scale and scope;
- The strength of direct and indirect network effects;
- Informational asymmetries between suppliers, market operators and users;
- Marginal cost advantages across organisational forms.

63. Based on Hagiu and Wright (2015a), Box 2.1 describes the specific factors driving the choice of operating as one business type instead of another. Box 2.1 aims at developing a comprehensive understanding of the dynamics of the digitalisation of the economy, beyond its implications for the tax system.

64. Overall, this section has described the structural economic characteristics of digital markets and of the businesses operating in such markets. In order to describe a multitude of relevant characteristics in a comprehensive but concise way, we have adopted a classification of business models/lines derived from the literature (Hagiu and Wright, 2015a; OECD, 2015c). The aim of this section has been twofold. First, before any discussion of the implications for the tax system, it is important to establish a wide-ranging understanding of the market dynamics of the digitalisation of the economy. Such understanding will lead to a better grasp of the broader effects of any tax measure suggested later on in the report. Second, the characteristics described in this section will shape the process of value creation described in Sections 3 and 4 of this chapter.

Box 2.1. The choice of type of business

Multi-sided platform versus reseller

From the perspective of the digitalised business, the choice of whether to operate as a multi-sided platform or reseller is driven by three main factors (Hagiu and Wright, 2015a). First, direct and indirect network effects increase the informational advantage of the company over the suppliers, implying that reselling becomes more attractive, especially if the company invests in data collection and analysis.

Second, economies of scope across products and customers favour reselling. For example, online platforms providing only one type of service such as accommodation or transportation typically operate as multi-sided platforms. Since each transaction matches very specific supplies and demands and as the economic benefits from expanding the range of products are limited, it is more beneficial for operators to leave control rights and liabilities with individual suppliers. In contrast, if products are more standardised, an existing reseller can easily adapt its business to include wider product ranges at lower average costs. Having established a global customer base reinforces this effect as users are more likely to return to the same reseller once they have created an account. If economies of scope are stronger it is thus beneficial to acquire control rights and operate as a reseller.

Third, marginal cost advantages between individual suppliers and resellers also affect the decision. The more extreme the relation between (higher) fixed and (lower) marginal costs, the less costly it is to adapt to demand fluctuations. For example, in the case of digital goods such as music or films, marginal costs are driven only by limits to computational power. A reseller (or vertically-integrated firm) owning the rights to a specific film or song incurs comparatively small risks associated with sudden reductions in demand. If marginal costs are instead higher, as for instance in the case of transportation services, idle periods represent a larger risk due to the fact that the firm still has to cover capital and labour costs. For products with less volatile demand, resellers could still have a cost advantage compared to individual suppliers; however, if demand is more volatile, it would be riskier and therefore cost-intensive for the platform-based business to operate as a reseller. Under such conditions it is thus often more efficient to provide goods or services through a multi-sided platform.

Multi-side platforms and resellers versus input suppliers

In contrast to multi-sided platforms and resellers, input suppliers do not operate as intermediaries. Instead, they produce or possess intermediary inputs, required for a specific production process, which they sell to other, typically vertically-integrated firms through standard single-sided markets. They are distinct from other business types discussed here in so far as they do not interact with customers of the final good. Intel or Tsinghua Unigroup, for example, are input suppliers as they provide microprocessors and other parts required for the construction of personal computers without directly interacting with customers.

Vertically-integrated firms versus resellers

The choice of whether to integrate or operate as a reseller is driven by several well-studied factors. On the one hand, vertical integration creates co-ordination benefits as it allows the firm to control and manage operations. This, in turn, increases production efficiency as it allows the firm to exploit economies of scale and scope. Some online streaming companies, for instance, started out as pure resellers and then expanded their operations gradually to include film and media production. On the other hand, vertical integration also carries additional costs as it implies that the firm has to hire additional employees which then exert costly effort to support additional operations.

A vertically-integrated firm, on the one hand, has control over the production process; it decides which technology to use, where to locate production and how many employees to hire. Ultimately, decisions over its output level therefore drive its average cost per unit of production. Resellers, on the other hand, do not operate production processes. Instead, they typically engage in market research and acquire tangible or intangible goods directly from producers or intermediaries; average costs are thus driven by producer prices although they could still be very low if marginal production costs are close to zero.

On the consumer side of the market, however, vertically-integrated firms and resellers face similar strategic choices. Being able to (re-)sell goods via an online platform allows them to reach a global customer base. If the marginal costs of production are indeed very low, as is the case for digital (or intangible) goods, vertically-integrated firms can adjust prices to attract demand from digital or non-digital substitute goods such as in the case of books. Resellers face a similar decision once they have acquired the rights for specific intangible goods such as films, music or other media content, for example. However, if marginal costs remain well above zero, both types of firms need to decide whether and how much to invest in inventories depending on the demand fluctuations for the various final goods they offer. Given that the development of an online platform and a global user base constitutes a significant share of fixed investment costs, firms with larger product ranges benefit from economies of scope in the sense that offering more products via the same website reduces average costs compared to competitors with smaller product ranges.

2.3. The value creation process

65. The previous section outlined how digitalisation has affected the structure of markets. As a consequence, it has not only enabled businesses to develop new products and services, but brought about structural economic changes which have affected fundamental aspects of the business models of multinational enterprises (MNEs) and start-ups alike (Brynjolfsson and McAfee, 2015; OECD, 2015a), including their process of value creation. This section is concerned with how digitalisation has impacted value creation in business models. Confronted with a multitude of processes of value creation, this section begins by classifying all of them, from the more traditional through to the most highly digitalised, into three groups: value chains, value networks and value shops. This section then systematically describes the process of value creation for each of these three groups.

2.3.1. Three concepts of value creation

66. Discussions of value creation tend to start with the value chain. Developed by Michael Porter in the mid-1980s, the value chain is a standard tool in academia and business applied to analyse a firm's competitive advantage (Porter, 1985). Value chain analysis divides a firm into discrete activities in order to understand how to create superior value, where superior value has two sources: by offering differentiated products which can justify a premium price or by reducing costs.

67. Since its publication, Porter's value chain has had several main critiques, all highly relevant in the context of digitalisation: (1) its limited ability to incorporate value created from information flows; (2) the fact that it was originally designed for applicability to domestic firms; and (3) its limited applicability to services.

68. Regarding the first critique, it is clear that a key feature of the digitalisation of the economy is the efficient and rapid transmission of data and information enabled by the Internet. While Porter saw the Internet as an enabler that increased efficiency, he did not see it as altering business strategy (Porter, 2001). Others, however, saw a clear need to adapt Porter's value chain to account for the fact that information had long been seen as central to value creation. In response, Rayport and Sviokla (1995) introduced the concept of the virtual value chain which serves as a useful refinement of Porter's value chain. It describes how value can be created from information captured in the course of primary activities.

69. Regarding the second critique, the value chain concept was broadened to account for the possibility that production processes may span several jurisdictions by introducing the concept of the global value chain (GVC). The GVC describes the need to co-ordinate business activities across geographies. This is highly relevant in the digitalised economy given the ease with which steps in the production processes of digitalised business, as well as their final goods or services, can cross borders. Indeed, when value creation is referred to, it is now the underlying assumption that the steps involved are not contained within a single geographic location or even a single firm. As explained in Section 5, this will have important implications for the tax system.[8]

70. Finally, regarding the third critique of Porter's value chain, while the value chain is well-suited to describing a process whereby inputs are converted to outputs in a sequential manner – think of a traditional assembly line manufacturer – the value chain concept is less able to describe business models engaged in the provision of services as a general category (both less or non-digitalised services, to more highly digitalised services). Stabell and Fjeldstad (1998) were the first to make this point. Citing the example of an insurance company, they ask: "What is received, what is produced, and what is shipped?" While an application of the value chain concept to an insurance business model would encourage an analyst to view uninsured people as a raw material or input to production, this is imprecise.

71. Stabell and Fjeldstad (1998) offer the solution that Porter's value chain is but one of three generic value configurations. In addition to the value chain, which models value creation that begins with raw materials and proceeds to a finished product, they identify two alternative models: the value network and the value shop. Given that businesses in the era of digitalisation are increasingly concerned with the provision of services, as opposed to the manufacture of tangible goods, it makes good sense to broaden our consideration of value creation along those lines.

72. The concept of the value chain models businesses where value is created on the basis of a linear production process as, for instance, in traditional, vertically-integrated manufacturing businesses. It also includes resellers in so far as their primary activities follow a sequential pattern. The concept of the value network portrays businesses where value is created by linking users, suppliers or customers (i.e., creating a network relationship) using a mediating technology. This category covers all types of multi-sided platforms. The concept of the value shop describes businesses where value is created by marshalling resources, that is, hardware and software as well as specialised knowledge, to resolve customer problems/demands. This includes digital and non-digital service providers that (i) do not operate linear production processes and (ii) do not act as intermediaries across multi-sided markets.

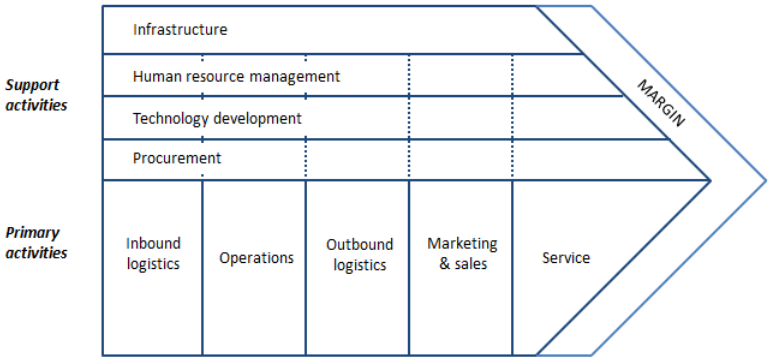
73. It is important to note that any classification of value creation processes will have limits when applied to the reality of actual companies and their lines of business. Whereas there may be other useful frameworks, the classification proposed in this section is effective in two ways. First, it helps systematise the large variety of businesses heavily reliant on digitalisation by organising their process of value creation according to three sets: value chains, value networks and value shops. Second, it systematically describes such processes of value creation across business models. Each of these three concepts of value creation is considered in more detail in the following subsections.

2.3.2. The value chain

74. The value chain is a theory of the firm that models a long-linked technology[9] (Thompson, 1967), where value is created by converting inputs into outputs through discrete but related, sequential activities (each of which can be thought of as a production function). It is a systematic way of examining all of the activities that a firm performs to design, produce, market, deliver and support its product(s) and how each of these functions interacts.

75. The basic value chain is comprised of five primary activities and four support activities (see Figure 2.2), the effectiveness of which determines the profit margin.

Figure 2.2. The value chain



Source: Porter, 1985

76. Primary activities are grouped together on the basis that they are involved in the physical creation of a product and its sale and transfer to the final customer. They include inbound logistics, operations, outbound logistics, marketing and sales and service.[10] As set out by Porter (1985), they are described in more detail as follows:

- Inbound logistics: Activities associated with receiving, storing and disseminating inputs to the product, such as material handling, warehousing, inventory control vehicle schedule and returns to suppliers.
- Operations: Activities associated with transforming inputs into the final product form, such as machining, packaging, assembly, equipment maintenance, testing, printing, and facility operations.
- Outbound logistics: Activities associated with collecting, storing and physically distributing the product to buyers, such as finished goods warehousing, material handling, delivery vehicle operation, order processing and scheduling.
- Marketing and sales: Activities associated with providing a means by which buyers can purchase the product and inducing them to do so, such as advertising, promotion, sales force, quoting, channel selection, channel relations and pricing.
- Service: Activities associated with providing service to enhance or maintain the value of the product, such as installation, repair, training, parts supply and product adjustment.

77. How a business carries out each activity is largely a reflection of its product(s). For example, for a reseller (e.g., Alibaba, Amazon retail, Carrefour, JD.com, Spotify premium services, Walmart), inbound and outbound logistics are the most critical, whereas the category of operations is the primary activity most important for a manufacturer (e.g., Apple's manufacturing business line, Huawei, Siemens). Other important factors in shaping the characteristics of a specific value chain are a business's history, its strategy and the underlying economics of the activities themselves. In any business, all the categories of primary activities will be present to some degree and play some role in contributing to a business's competitive advantage.

78. Primary activities are sustained by support activities providing purchased inputs, technology, human resources and various business-wide functions. Support activities include procurement, human resource management, technology development and firm infrastructure. Each of the first three support components can be associated with specific primary activities as well as supporting the entire chain. Firm infrastructure, on the other hand, is not associated with individual primary activities but supports the entire chain. As set out by Porter (1985), the four support activities are described in more detail as follows:

- Procurement: Activities associated with the function of purchasing inputs used in the firm's value chain. Purchased inputs include raw materials, supplies and other consumable items as well as assets such as machinery, laboratory equipment, office equipment and buildings.
- Human resource management: Activities associated with recruiting, hiring, training, human capital development and compensation of all types of personnel.
- Technology development: Activities broadly grouped into efforts to improve the product(s) and process(es), from basic research and product design to media research.
- Firm infrastructure: Activities including general management, planning, finance, accounting, legal, government affairs and quality management.

79. With reference to the business models identified in Section 2, examples of businesses in this group include traditional, vertically-integrated manufacturing firms producing tangible goods (e.g., BMW, Coca Cola, Unilever, IKEA) but also any other firms operating linear production processes aimed at producing intangible goods or services such as, for instance, movies, games, music or software (e.g., Disney for films,

Sony for games, Microsoft for software but also Netflix where it creates original content). It also includes resellers operating websites for various types of tangible (e.g., Alibaba, Amazon retail, JD.com, Walmart) and intangible products (e.g., Netflix where it purchases content, Spotify, Tencent's music distribution business line). Finally, it also includes input suppliers, such as companies that create goods for sale to resellers (e.g., Intel) and companies that have created and developed apps for sale through app stores.

2.3.3. The value network

80. Whereas the early 20th century was the era of mass production of products, from cars onwards, the early 21st century is the era of mass production of services. One of the effects of digitalisation is that businesses are increasingly likely to be providing services, rather than being engaged in the manufacture of tangible goods. This development challenges the suitability of the value chain described in Subsection 3.2 as a one-size-fits-all framework for examining value creation. Instead, the concept of the value network is a more natural framework for many more highly digitalised firms and, in particular, platform-based businesses such as multi-sided platforms as defined in Subsection 2.3.

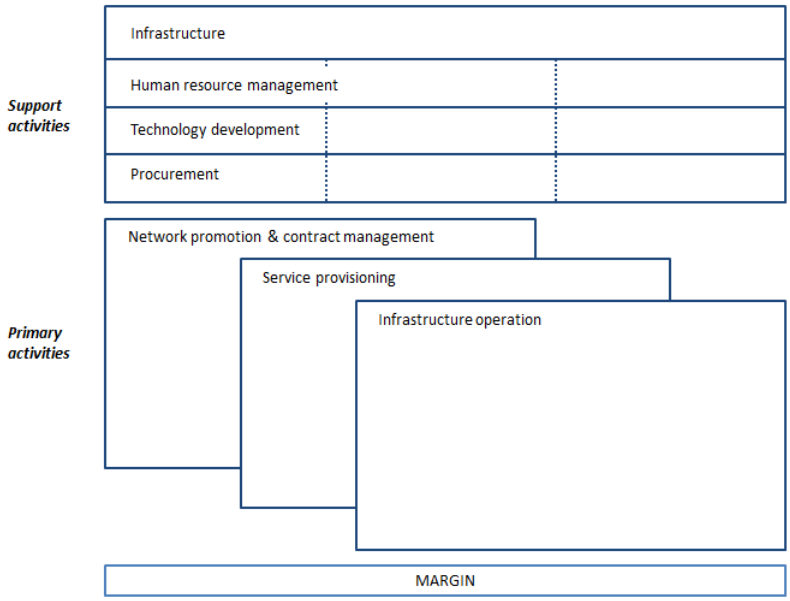
81. Value networks rely on a mediating technology: a technology used by platform operators to link customers interested in engaging in a transaction or relationship (whether for financial consideration or not). The mediating technology facilitates exchange relationships among end-users distributed in space and time. Examples of traditional, non-digital value networks include employment agencies that bring together employers and job seekers, and banks that join investors and borrowers. However, digitalisation, in particular the Internet, has greatly expanded the role of mediating technology, linking users and customers with every conceivable kind of supplier and service (Hagel and Singer, 1999).

82. Internet-enabled value networks include social networks that bring individuals together in a social capacity and allow advertisers to target specific user groups. Search engines fulfil a similar function by providing certain web-based services for free while generating revenues from targeted advertising and the monetisation of user data. Commercial peer-to-peer platforms allow users to trade goods and services. Other platform operators facilitate collaborative consumption of durable goods or assets by enabling individuals to connect and share spare resources such as cars or housing.

83. These business models develop procedures and services for, and process information about, producer and customer needs. The term value "network" emphasises the notion that a critical determinant of value to any particular user is the set, or network, of other users that are connected. In a value network, value is created through the action of linking: the organisation and facilitation of exchange between users. Linking may be direct, as in the case of a telephone service, social network or other service in which two users who otherwise would not have been in contact are brought together. In this case, links are made using data volunteered by the users (i.e., phone numbers or social network usernames, or identification of a particular need) or linking may be indirect, as in retail banking or insurance where one customer is not linked directly to another customer, but a group of customers is linked through a common pool of funds.

84. The basic value network is comprised of three primary activities and the same four support activities presented in the value chain (Figure 2.3), the effectiveness of which determines the profit margin.

Figure 2.3. The value network



Source: Stabell and Fjedstad, 1998

85. The primary activities that comprise a value network are:

- Network promotion and contract management: Activities associated with inviting potential users to join the network, selection of users that are allowed to join and the initialisation, management, and termination of contracts governing service provisioning and charging.
- Service provisioning: Activities associated with establishing, maintaining, and terminating links between customers and billing for value received. The links can be synchronous as in telephone service or asynchronous as in e-mail service or banking. Billing may require measuring individuals' use of network capacity in volume or time (e.g., telephone calls billed by the minute, data usage by volume).
- Network infrastructure operation: Activities associated with maintaining and running a physical and information infrastructure. The activities keep the network in an alert status, ready to service user requests.

86. As in the value chain, how a business carries out each activity is largely a reflection of its product(s) or service(s). However, as opposed to the sequential ordering of activities in the value chain, activities in a value network are performed concurrently, as represented in Figure 2.3 by the overlap of primary activities.

87. Revenue in value networks may be generated through subscription fees (e.g., LinkedIn Premium) or pay-as-you-go fees when services are consumed (e.g., Airbnb, BlaBlaCar). In other cases, such as Instagram, Facebook, Twitter and Weibo, the business may, in what may be perceived by some countries as a type of barter transaction, offer access to the platform without a demand for financial compensation upon the user providing some input valuable to the platform operator. Such input could be personal information about the user's interests that can be employed to generate revenue from targeted advertising. It could also be content accessible by other users, which increases the platform's utility and value. As explained in Section 2, this non-neutral pricing

mechanism, which allows firms to price below marginal cost on one side of the market, is typical of companies operating in multi-sided markets.

88. With reference to the business models identified in Section 2, examples of businesses which have a value network approach to value creation include varieties of multi-sided platforms, such as e-commerce intermediaries (e.g., AliExpress, Amazon Marketplace, app stores such as Apple's App Store), collaborative consumption firms (e.g., Airbnb, BlaBlaCar, Didi Chuxing) and social networks (e.g., Facebook, Nice, Kuaishou, Sina Weibo, Tencent Weibo, Twitter, Qzone).

2.3.4. The value shop

89. While the concept of the value network describes a slice of the more highly digitalised group of firms, not all service business models depend upon network relationships. Another variety of service that is not well-described by the value chain or by the value network is the concept of the value shop. The value shop operates in single-sided markets where interactions take place with one specific type of user or customer; it is characterised by the use of an intensive technology applied in order to solve a specific customer demand or problem. Intensive technology is the combination of hardware, software and knowledge used to change a specific outcome, usually found in the category of professional services. The problem to be solved, or in other words the type of consumer demand, determines the intensity of the shop's activities.

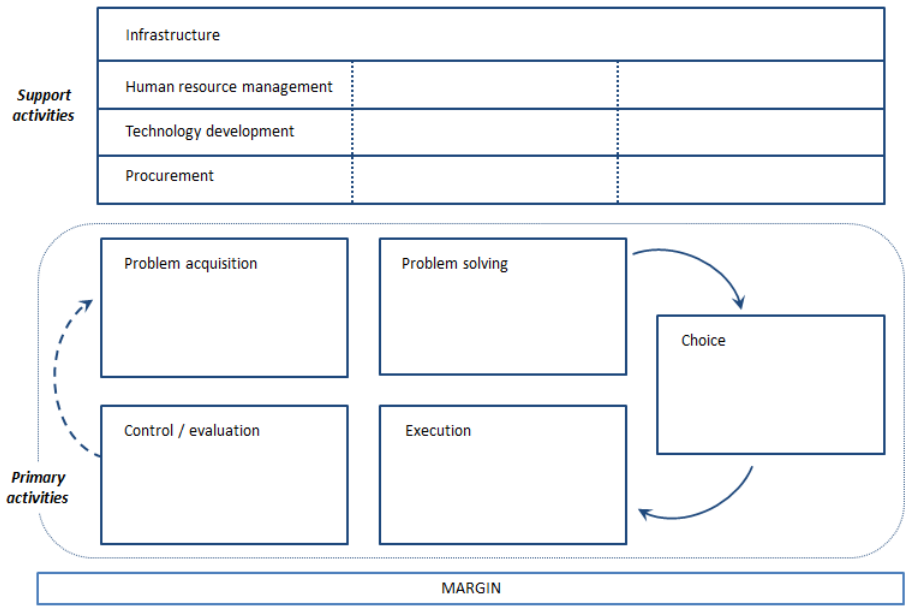
90. Examples include medical technology used to diagnose and treat a patient's disease, laboratory technology used in university research to conduct experiments, business consulting, specialised data analysis, software development or cloud computing; all of these examples entail highly customised technological solutions that allow businesses to outsource their technological infrastructure.

91. Customer problems are defined as differences between an existing state and an aspired state; for example, non-digitalised business operations could be the existing state whereas digitalised, cloud-based operations the aspired state. Problem-solving, and thus value creation, is the change between one state and another, where the intensive technology is the solution's means.

92. It is important to note that the value shop is often born out of a strong information asymmetry between the business and its customer; the asymmetry is the reason that the customer approaches the business. And while customer problems may be solved with more or less standardised solutions, the value creation process of a value shop is organised to deal with unique cases.

93. The basic value shop is comprised of five primary activities and the same four support activities presented in the value chain (Figure 2.4), the effectiveness of which determines the profit margin.

Figure 2.4. The value shop



Source: Stabell and Fjedstad, 1998

94. The primary activities that comprise a value shop are:

- Problem-finding and acquisition: Activities associated with recording, reviewing and formulating a problem to be solved. Problem-finding and acquisition have much in common with the marketing and sales activity in the value chain. The customer owns the problem to be solved.
- Problem-solving: Activities associated with generating and evaluating alternative solutions.
- Choice: Activities associated with choosing among alternative solutions to the problem. Choice is an activity category that in most contexts is of limited importance in terms of effort and time but is important from the point of view of value.
- Execution: Activities associated with communicating, organizing, and implementing the chosen solution.
- Control and evaluation: Activities associated with measuring and evaluating the extent to which implementation has solved the initial problem.

95. As Figure 2.4 shows, the value shop is a cyclical value system, where post-executing evaluation can be the problem-finding activity of a new problem-solving cycle.

96. Value creation in the value shop flows from the delivery of relatively certain solutions to customer demands, rather than for services offered at low prices. Reputation is an important signal of value, which is demonstrated through prizes, the hiring of star employees, publications in prestigious journals and strong customer demand in the form of long queues or difficult access.

97. With reference to the business models identified in Section 2, examples of businesses in this group include input suppliers of computing power to other businesses (e.g., cloud computing firms) as well as vertically -integrated professional services firms.

2.3.5. Business model classification according to their process of value creation

98. The subsections above have described value creation according to three categories: the value chain, value network and value shop. These provide a broad classification of value creation in an era of digitalisation. Though we have thus far referred to value creation in business models, it is worth emphasising that it is more precise to refer more specifically to value creation in business lines. As described, the structure and dynamics of the digitalisation of the economy, and in particular economies of scope, facilitate modular business models as firms take advantage of their market power as well as of the complementarities to be realised across business lines. Indeed, it is even common for one business model to span multiple value creation categories. For example, Amazon's retail business is considered a value chain, as are some of its other business lines, such as its audio books business, Audible, whereas Amazon Marketplace, which links buyers and sellers in order for them to trade, is considered a value network and Amazon Web Services is considered a value shop. The business model of Alibaba is similarly modular. For clear analysis, we will consider value creation in individual business lines in isolation before considering a firm's business model as a whole.

99. Figure 2.5 summarises the main features of each value creation concept, as presented above. In addition, recognising that it may be useful to understand each value creation concept by attaching specific firm names, the last row provides examples of digitalised economy business lines in each category. Business lines have been grouped into types (e.g., manufacture of goods, resellers, multi-sided platforms of various types, including social networks, cloud computing) in order to orient readers on the basis of common business model classifications. However, it should be noted that this list of businesses does not aim to be exhaustive. Using the empirical framework analysed here, Section 4 will explore value creation according to a case study developed after studying and consulting real businesses, with additional case studies explored in Annex 2.A.

Figure 2.5. Three concepts of value creation

	Value Chain	Value Network	Value Shop
General description	A value chain's objective is the conversion of inputs into outputs through discrete but related, sequential activities (each of which can be thought of as a production function). The final goods may be manufactured by the company itself or acquired. In general, the final goods are standardised.	A value network's objective is to serve as an intermediary, facilitating (1) bilateral interactions between itself and its customers, and (2) multilateral interactions between its customers (e.g., buyers/sellers; passengers/drivers). Value creation may be in the formation of direct links between customers (e.g., a telephone call or a friend request) or of indirect links (e.g., a commerical bank can make a loan by virtue of the deposits that customers supply in aggregate).	A value shop's objective is to solve a problem, thereby tranforming an existing state to a more desired one. The problems are characterised by information asymmetry (i.e., the shop has more information than its customers). The process to arrive at a solution may be labour intensive with respect to professionals & specialists, & may either be standardised or highly customised.
Primary technology	Long-linked: linear process that begins with inputs & proceeds to deliver a finished product to a final consumer	Mediating: used by organisations to link users or customers interested in engaging in a transaction	Intensive: forms of hardware & knowledge used to change some specific object
Value creation logic	Value is created by transfering a product from the firm to its customers	Value is created by organising and facilitating exchange between (linking) customers	Value is created by (re)solving a customer problem or demand
Primary activity categories	Activities organised <u>sequentially</u>: ▪ Inbound logistics ▪ Operations ▪ Outbound logistics ▪ Marketing ▪ Service	Activities organised <u>simultaneously, in parallel</u>: ▪ Network promotion & contract management ▪ Service provisioning ▪ Infrastructure operation	Activities organised as an <u>iterative cycle</u>: ▪ Problem-finding & acquistion ▪ Problem-solving ▪ Choice of approach to find solution ▪ Execution ▪ Control/evaluation
Traditional business model examples	▪ Assembly line manufacturing ▪ Wholesale distribution business	▪ Employment agencies bringing together employers & job seekers ▪ Banks joining investors & borrowers	▪ Medical technology used to diagnose & treat a disease ▪ Professional services (legal, consulting, financial)
Digital economy business model examples	**Manufacture of goods (vertically-integrated firms)** <u>Tangible goods:</u> • Unilever, Coca Cola, GE, Siemens, BMW, IKEA, Microsoft (PCs, tablets, Xbox), Apple (PCs, tablets, iPhone), Huawei (devices), Sony (devices, electronics), Intel, IBM, Cisco, Tsinghua Unigroup (microchips), Xiaomi <u>Intangible goods & digital content:</u> • Creative content: Disney, Netflix, Sony • Software (one-time purchase of standard package): Microsoft, Adobe, SAP, Dassault Systems, Dropbox, Weiyun, Google Drive **Resellers** <u>Tangible goods:</u> • Alibaba, Amazon retail, JD.com, Tencent, Walmart <u>Intangible goods & digital content:</u> • Creative content: Netflix, Sony (films/music), Spotify, Tencent's music distribution business line, Deezer, Amazon Audible • Software (one-time purchase of standard package): Amazon, Best Buy **Input suppliers** • Companies that have created goods for sale to resellers: Intel, Tsinghua Unigroup • Companies that have created apps to supply to app stores	**Multi-sided platforms** <u>E-commerce intermediary</u> • Tangible goods: AliExpress, Amazon Marketplace, eBay, Etsy • Intangible goods: Trivago, Booking.com, Hotels.com, Kayak; Google Play, Apple iTunes store <u>Service intermediary</u> • Collaborative consumption / sharing economy: AirBnB; Blablacar, Drivy, Turo, Uber, Didi Chuxing, Ola; Deliveroo, Foodora, TaskRabbit, Upwork • Social networks: Facebook, LinkedIn, Sina Weibo, Tencent Weibo, Twitter, Nice, Kuaishou, Qzone • Online gaming and gambling • Search engines: Google, Bing, Yahoo, Baidu, NetEase • Email: Gmail, Yahoo, Hotmail, NetEase • Online content: Dailymotion, SoundCloud, TripAdvisor reviews, Vimeo, YouTube • E-payments: Transferwise, Alipay, Tenpay, Paypal, Worldpay	**Cloud computing / input suppliers of computing power to other businesses** (X-as-a-Service, potentially completely vertically integrated) <u>IaaS:</u> • AWS, Alibaba, Microsoft, IBM, Huawei, Cisco, Intel <u>PaaS:</u> • AWS, Alibaba, Microsoft, IBM, SAP SaaS business lines generally fall into the value chain category with the exception of software that is customised for users. **Professional services (vertically-integrated firms)** • IoT consulting: GE, Siemens • Data analysis

2.4. Business model case study

100. This section sets out a useful framework for the analysis of various value creation processes. Section 4 and the related Annex apply this framework to several digitalised business model types: a reseller of tangible goods as an example of a value chain, two multi-sided platforms: a ride-for-hire company and a social network as examples of value networks, and finally, a cloud computing company as an example of a value shop. For each business case, the process of value creation is analysed in detail with the objective of isolating the features relevant for the tax system.

101. The main body of the chapter focuses on the case of the social network as the business model where the implications of digitalisation for the tax system are the most apparent. The examples of a reseller of tangible goods, a ride-for-hire company and a cloud computing company will be analysed in Annex 2.A.

102. Our approach is to first identify the business model's inputs, outputs and relationships. This serves to illustrate the important transactions between the business headquarters and other related entities as well as between the business and its final customers, including identification of which transactions may be cross-border.

103. Next, in order to focus on how the business model has changed over time, we compare the more highly digitalised business to its more traditional counterpart (where clear comparisons can be made).[11] The aim of the comparison is to evaluate whether digitalisation has enabled new means of value creation. Such an understanding will then inform our evaluation of the effects of digitalisation on the tax system.

2.4.1. Value network: Social network supported by advertising revenue

Business model overview

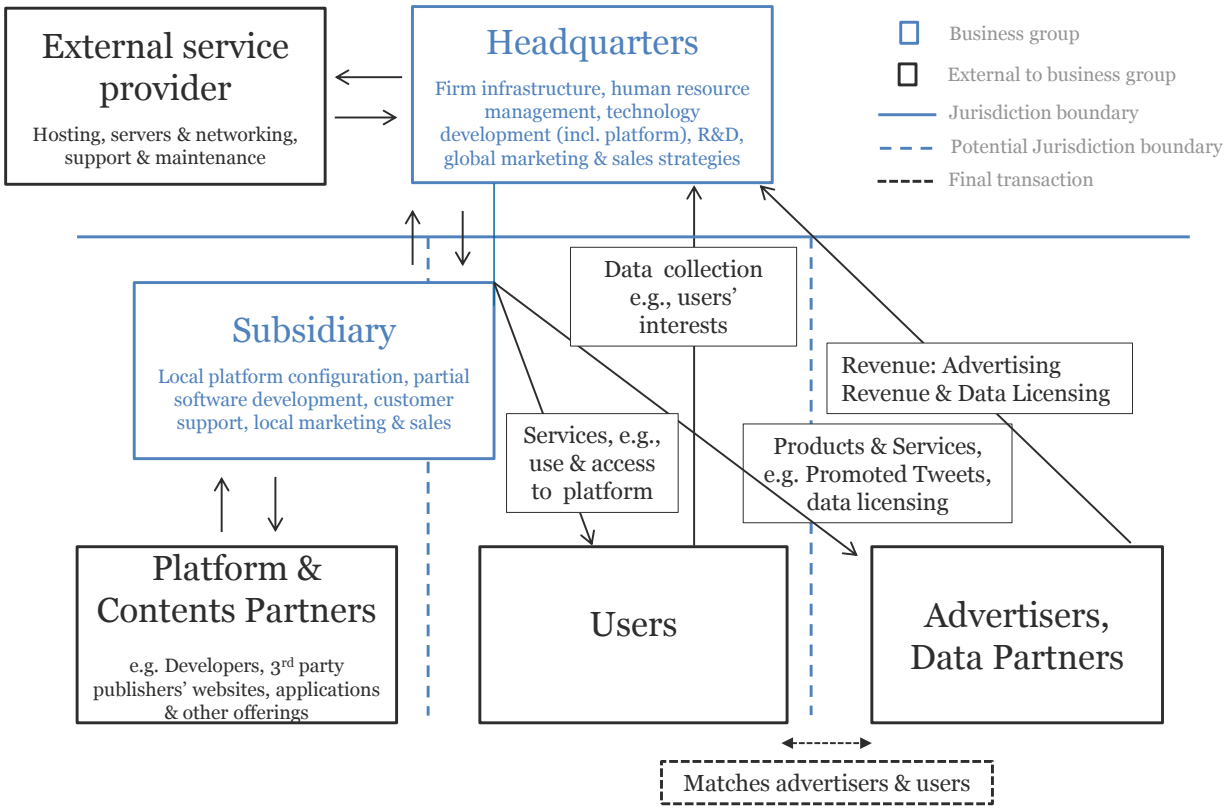
104. The social network considered here is a multi-sided platform that collects user data and provides advertising services. This type of business model has two objectives. First, on one side of the market it aims to provide a platform for users to connect to one another and share content. A user participates by linking to other users, where links are formed on the basis of relationships in the real world or on the basis of topical interest not necessarily dependent on a relationship between users (e.g., Facebook, LinkedIn, Nice, Kuaishou, Sina Weibo, Tencent Weibo, Twitter, and Qzone). From a user's perspective, social networks operate by collecting the content generated by the set of users to whom an individual is linked into a web or news feed, a data format used for providing users with frequently updated content. Users access news feeds via the web or via apps, and access is generally provided without requiring the payment of fee. The traditional equivalent of this business model could be a membership-based social club.

105. Second, on the other side of the market, the social network aims to enable customers who wish to advertise on the platform to reach their target audiences (i.e., the users on the other side of the market) in an effective and efficient manner. Advertising space is purchased by parties wishing to advertise their ideas, brands, products and services, and amplify their visibility and audience reach. Social network companies have a variety of means of offering advertising space on their platforms, including promotion of content that appears in news feeds, as well as promotion of trends and of certain user accounts. The placement of advertising is based on attributes such as geography, demography, interests, content keywords, events and device type. The traditional

equivalent of this business can be seen in the placement of more traditional forms of advertising, such as television or radio commercials.

106. As typical of operators in multi-sided markets, the two objectives of linking users and providing advertising services are complementary: the fulfilment of the first objective provides market research for the second. Users of the social network provide data in the form of geographic and demographic information, volunteered content and behavioural data in the course of interacting with the network. This data allows the company to learn about its user base. From the company's perspective, its user communities are of value because they are the means of attracting the main commercial customers: advertisers. The general social network business model is illustrated in Figure 2.6.

Figure 2.6. Schematic of a social network business model



Revenue

107. Social networks tend to generate revenue by selling advertising space to third parties that wish to advertise to users on the platform and by potentially licensing user data collected to third parties. It is common for social network companies to derive the majority of their revenue from the first channel.

Use and ownership of intellectual property

108. Social network companies generally protect their intellectual property rights with a combination of trademarks, trade dress, domain names, copyrights, trade secrets and patents. They may also enter into confidentiality and invention assignment agreements with employees, contractors and other third parties, in order to limit access to, and disclosure and use of, confidential information and proprietary technology. As described in more detail below, algorithms are instrumental for data analysis, which allows the platform to maximise the user experience and as well provide highly targeted and efficient advertising business.

Data

109. A social network company uses data in two main ways: to enhance the user experience and to help advertisers to better target customers in order to increase advertising sales. Though the social network's commercial customers are advertisers, it is nonetheless important to enhance the user experience to maximise the number of users, the size of the network and the amount of time users spend interacting on the platform. All of these factors increase the potential for the social network to secure more advertising revenue. Social networks are conscious of the need to balance advertising content with user-generated content, and for advertising content to be well-targeted in order to maximise the user experience. User data and user-generated content form the basis of targeting strategies: the larger the amount of data and user-generated content and the more refined the data analysis, the larger the potential profit. The information offered by users is distilled into keywords that describe a user's characteristics or interests. Advertising content is then pushed to users with the profiles that companies wish to reach.

Value network

110. As described, the value network is comprised of three primary business activities: network promotion and contract management, service provisioning and network infrastructure operation. This section compares a social network company to an example of one of its traditional counterparts: a television company that broadcasts programs interspersed with commercial advertising.

111. Figure 2.7 shows the value networks for a traditional television agency (Panel A) and for a social network company supported by advertising revenue (Panel B). By comparing the two across each of the primary value network activities, the next paragraphs explore how the key elements of the traditional television company business have changed as a consequence of digitalisation.

Figure 2.7. Value network: A social network company's business activities compared to those of a traditional television company

Panel A: Value network of a traditional television company			
	Network promotion & contract management	**Service provisioning**	**Network infrastructure operation**
Primary activities	For advertiser customers: • Source advertiser customers through sales presentations • Contract with advertiser customers on the terms & conditions (e.g. pricing, broadcast time & duration) • Advertiser customers are generally domestic (geographically bounded) For TV audience: • Produce or purchase TV shows & programs to attract television viewers • Access to channel provided for free Other: • Contract with infrastructure distributors (e.g., cable & satellite operators, telecom) Data collection: • Database to manage contracts with advertisers Tech-IP: • Database management tools	For advertiser customers: • Create schedule of ad slots • Formulation of ad placement strategies (e.g. prime time) • Measure effectiveness of an advertising campaign at its conclusion (e.g. ratings of a given show) For TV audience: • Broadcast of TV shows & programs • Balance ad length & ad display in between or during the shows/programs • Aim to maximise well-targeted advertising Data collection: • Collection of data to estimate viewership details (e.g., age, location, sex) • Viewership analysis (e.g., who is watching and why, television rating points to target advertising Tech-IP: • Infrastructure (electronics, servers, hardware) • Devices to monitor viewership • Computer-generated imagery, symbols, graphics, & the software to create it	• Invest in hardware • Market research to collect data & analyse information Data collection: • Sampling devices installed to audience (dairies/people meters) • Storage of viewership data • Devices to monitor viewership Tech-IP: • Infrastructure
Technology	Telephone, fax, television network hardware, computing & database infrastructure	Telephone, fax, television network hardware, computing & database infrastructure	Telephone, fax, television network hardware, computing & database infrastructure
Panel B: Value network of a social network company supported by advertising revenue			
	Network promotion & contract management	**Service provisioning**	**Network infrastructure operation**
Primary activities	For advertiser customers: • Source advertiser customers **by demonstrating wealth of user data** • **Advertiser customers are global** **For social network users:** • **Social network users are global** • **Particularly important to attract & retain influential people as users** • **No need for media partners to distribute ads** Data collection: • Database to manage the contracts with advertisers, relevant vendors & partners • **Storage of basic social network user profile data** • **Advertising customers are recruited by demonstrating a wealth of social network user data** Tech-IP: **Platform**	For advertiser customers: • Ad placement • **Measure user engagement with ads *in real time*** • **Potential to adjust ad placement strategy** • **Rates based on user engagement with ads** **For social network users:** • **Platform to create, consume & distribute content** • **Balance mix of user content & advertising** • **Aim to maximise well-targeted advertising** • **Customer service: ensure privacy & security** Data collection: • **No traditional market research; need supplanted by user data provided through the social network** • **Social network users contribute: user-created content (posts), demographic & geographic data, browsing & online action history** Tech-IP: • **Platform** • **Algorithms to optimise ad placement strategies** • **Auction platform for setting advertising prices**	• Invest in computer hardware • **Platform development** • **Development of mobile phone interface, compatible with developer & other content providers/websites** Data collection: • **Storage of data reflecting network infrastructure use (e.g., across regions) for resource optimisation** Tech-IP: • **Platform** • **Algorithms**
Technology	**Computer hardware, software, app, algorithms**	**Computer hardware, software, app, algorithms**	**Computer hardware, platform capable of accommodating peak traffic**

Network promotion and contract management

112. As previously noted, network promotion and contract management is the category of activities associated with inviting potential customers to join the network, selection of customers that are allowed to join and the initialisation, management, and termination of contracts governing service provisioning and charging.

113. A social network company's business model is the fostering of a social network that then serves as an audience for customers who sell advertising on the social network. To best serve their advertiser clients, social networks seek to foster broad and engaged user communities. To this end, they seek to recruit influential people to the network, including world leaders, government officials, celebrities, athletes and journalists, as well as media outlets and famous customers' brands. Since the social network operates in a two-sided market, it can use the pricing flexibility described in Section 2: as the transactions with the users on one side of the market can be priced at zero, a seemingly free service has the potential to attract a large amount of users.

114. The need for network promotion exists for a traditional television company in a manner similar to a social network company: both aim to foster a community of users interested in the content made available. In the first case, this takes the form of programs broadcast on a television channel, whereas in the second it takes the form of posts made available on the social network's website or app.

115. Moreover, both a traditional television company and a social network are interested in two kinds of network promotion: viewers/users consuming content on their platforms as well as advertisers reaching viewers or interacting with users.[12] A difference, however, is that television viewers do not interact with one another in the same direct way in which social network users interact.

Users connected to users

116. Promoting its user-to-user network is a key aspect of a social network company's business model: the more users and the more time they spend on the network (and the more they engage), the more content they create and the more they are available to be targeted by advertising. All of these factors are central to increasing the value of the advertising business of the platform. Direct network effects are more important for a social network compared to a television company, where viewers do not interact directly on the platform itself, and thus no data is available to be collected from such interactions.

117. As described above, in order to encourage users to join its network, social networks offer the use of their platforms to users without requiring any financial payment. In addition, barriers to engaging with the social network website can be low. While an account is generally required in order to post content, an account can in some cases be opened without any information that reveals an individual's real identity (e.g., Twitter) and in other cases users need not even have to have an account to view the network's content. By lowering such barriers, the company aims to encourage users to visit its website or mobile app as often as possible and for as long as possible. However, some social networks require a real identity (e.g., Facebook, Sina Weibo). In these cases, the social network also serves as a means of validating a user's identity on other platforms.

Advertisers connected to users

118. The recruitment of advertiser customers and the maintenance of relationships with advertising clients is one way in which social networks and traditional television companies are quite alike. Both require sourcing of businesses to which they can sell advertising space. As social network users are spread globally, the businesses that it seeks to work with may also be global. This is in contrast to television networks, which generally operate in local regional markets due to regulatory barriers and language differences.

Service provisioning

119. In some ways, the service provision activities of social network companies' advertising business lines are similar to those of traditional television companies: both require the means to place advertisements so as to reach target audiences. However, a clear difference between a social network company and a traditional television company in the placement of advertisements is that all of a social network's content resides online and can be targeted to users at the individual level. In contrast, traditional television companies advertise to a relatively larger group of viewers at once. An advertiser customer places its commercials according to the shows that its target audience is likely to watch.

120. As a result, strategies to measure user engagement with advertisements are different, and this represents a key difference between the two business models. A social network company is able to be more precise relative to a traditional television company. This stems from its ability to collect data on users' movements and activities on the Internet, which cannot be accomplished on television: while estimated television ratings and viewership data aims to ascertain how many people – and who – watch a given commercial, this only delivers rough estimates compared to a social network company's metrics. For example, an advertising campaign focused on boosting usage of a given app would track the number of app installs that can be attributed to the related promoted product.

121. Social networks build a profile of a user's interests, sentiments and preferences by analysing their content (i.e., posts and tweets) as well as groups of followers and clickstream histories. Social networks are able to know precisely, and in real-time, how users are engaging with promoted products, in many cases even identifying the extent to which an advertisement has led to the purchase of a product that was the basis of the advertisement. As a result, they are much better equipped to assess the effectiveness of the advertising campaign.

122. Underlying the provision of service to advertising customers is the fact that, in both cases, television viewers and social network users are attracted to the platform by the content made available. It is important to note that in the case of a television company, content is either produced by the company or purchased from a third party for broadcast. However, in the case of a social network, a very large proportion of the content is contributed by the users themselves. The content is original and it is contributed without financial compensation.

123. The content and data provided on an individual level that enable social networks to be particularly adept at targeting advertising also opens its users up to privacy and security concerns. Thus, as part of its customer service, they must protect their

communities from hacking, account theft/identity fraud, etc. This is not something with which a television company need be systematically concerned.

124. Finally, another difference between a social network company and a television company in terms of service provisioning is that while television companies may provide advertisers with basic information collected by rating agencies about viewership levels and demographics for various programs and time slots, social network companies offer services that focus relatively more on the placement of ads using data analysis driven by sophisticated algorithms and big data. In addition, social network companies may not require the same type of market analysis as a TV network since the content provided by users may generally be compelling enough to attract other users to the site and to keep them there, which happens in part because it is tailored at the individual user level and users are able to interact with one another. Therefore, such social network companies may provide content of a higher interest for the audience.

Network infrastructure operation

125. Network infrastructure operation for both business models are comprised of: (i) gathering data about potential target audiences for advertising purposes; (ii) forming strategies according to which those target audiences can be reached; and (iii) setting rates according to different advertisement characteristics. Though a social network and a traditional television company have the fact of these activities in common, they go about each in different ways.

126. Whereas a traditional television company will engage in market research, on behalf of itself or by contracting with a third-party, a social network company has the benefit of generating its own user data digitally due to the community it fosters on its platform. A social network company gathers user-generated content, as opposed to profile or demographic data, which may enable it to learn more about users' interests and preferences. Moreover, user data is available on the social network platform in real-time, in contrast to the backward-looking data gathered by market research surveys and through viewership numbers. As a consequence, social network companies are able to identify trending topics and tailor the promoted products that they offer to what users most want to see.

127. Regarding the setting of advertisement rates according to different advertisement characteristics, just as other highly digitalised firms are able to price differentiate using data on product supply and demand, social network companies generally rely on an auction to set the prices of their advertising products. This allows them to extract the maximum price that businesses are willing to pay for advertising.[13] A traditional television company, in contrast, may set prices according to advertisement characteristics (e.g., commercial length) and popularity of certain time segments (e.g., during major sports matches, peak viewership). Ultimately, the price of advertising on a social network is linked to the user engagement achieved, however, little is publicly known about the exact pricing formulae used by the various companies.

128. Finally, as a consequence of the greater ease with which a social network company is able to cross jurisdictions with respect to inbound logistics, its operational activities also take place across jurisdictions.

Technology

129. The key difference is a social network company's development of its platform, the core of the company's operations. The platform is the result of substantial investment in technological inputs: computer hardware and software, software engineers, website designers, algorithms, servers, etc. In particular, a social network company must ensure the stability and integrity of its platform by maintaining privacy and sufficient server space to handle a great volume of user traffic.

2.5. Common characteristics of digitalised businesses models

130. The previous section with its Annex 2.A analysed digitalised business models through a number of practical case studies comparing the value creation process of highly digitalised businesses and their traditional counterparts. It emerges that, while the main objectives and primary activities have remained unchanged, the structure of businesses and the process of value creation have significantly evolved, especially for some enterprises. Using the analysis in Section 4 together with the economic theory and empirical evidence, this section first isolates some of the most salient, common characteristics of more digitalised business models. These common characteristics are cross-jurisdictional scale without mass, the importance of intangible assets, and the importance of data, user participation and their synergies with IP. In relation to other determinants of value creation (e.g., administrative, marketing and people functions), there appears to be less difference between traditional and more digitalised businesses. For this reason, the focus of the analysis is on the main differences between traditional and more digitalised businesses. The section concludes by considering the extent to which these factors represent key drivers of value creation in digitalised businesses, reflecting the diversity of views among members of the Inclusive Framework on BEPS. The implications for international taxation of this chapter's analysis of the business models of digitalised firms are addressed in Chapter 5 of this report.

2.5.1. Cross-jurisdictional scale without mass: The global reach of business functions and activities

131. While globalisation has allowed businesses to locate various parts of their production process across different countries, and at the same time access a greater number of customers across the globe, this trend has intensified with digitalisation. The increased commercial reach of businesses as a result of digitalisation has occurred regardless of the location of the businesses users and/or customers or the businesses' headquarters or the even the distance between the two.

132. Through the use of remote technology, many digitalised businesses can effectively be heavily involved in the economic life of different jurisdictions without any, or any significant physical presence, thus achieving operational scale without mass.[14] One consequence of this development is that a growing number of businesses may have an economic presence in a jurisdiction without having a physical presence.

133. While the relation between physical presence or material substance and scale varies across the cases analysed in Section 4 and in Annex 2.A., it is clear that digitalisation is also driving a process of de-materialisation in many of the business models of more digitalised firms.[15] The process of digitalisation of the economy is perhaps still only at its early stages even in the most advanced economies (OECD, forthcoming). As growing numbers of firms invest in digitalisation, e.g., by moving to

cloud-based operations, it will become increasingly easy for formerly purely domestic firms to interact digitally with their customers. As a result and as the opportunities of digitalisation are not restricted to large multinationals, small firms are also more capable of reaching a global customer base.

134. While digitalisation has been a key enabler that has allowed many firms to achieve cross-jurisdictional scale without mass, it should also be acknowledged that the growing global economic footprint of firms is not unique to digitalised business models. The fact that an increasing number of firms are able to achieve an increased economic presence in a jurisdiction without maintaining a significant physical presence is also a function of globalisation more generally and is not unique to digitalised businesses.

2.5.2. Reliance upon intangible assets, including intellectual property rights

135. Intangible assets can be an important driver of business value. The location in which a business' intangible assets are controlled/managed can therefore have a material impact on where that business' profits are subject to tax. The analysis in this chapter shows that intangibles are crucial contributors of value for digitalised businesses. The business case studies in Section 4 and Annex 2.A clearly point in this direction and there is also considerable empirical evidence supporting this finding.

136. Based on the analysis of the World Intellectual Property Organisation (WIPO) statistical database, the demand for intellectual property (IP) rights[16] experienced strong growth over the previous decade. Taking industrial designs, patents, trademarks and utility models together, total IP rights applications have increased by an annual average of around 7.1% from 2004 to 2016, leading to an increase of more than 125% over the same period (WIPO, 2018). Using more granular data, WIPO (2016) shows that while trademarks (36.5 million) and patents (10.6 million) make up for the largest stock of IP rights currently in force, global filing activity increased markedly in 2015 for most types of IP: 27% for utility models, 13.7% for trademarks, 7.8% for patents and 0.6% for industrial designs. New filing activity for all four types of IP rights is concentrated in Asia which accounts for 95.6% of new applications for utility models, 68% of industrial designs, 61.9% of patents and 55.3% of trademarks. For patents, around four-fifths of all new filings in 2015 were registered in just five offices: China (38.1%), the United States (20.4%), Japan (11%), the Republic of Korea (7.4%) and Europe (5.5%). Clausen and Hirth (2016) show the increasing importance of intangible assets on firms' balance sheets over time; interestingly, these effects are also shown to persist throughout the economic crisis of 2008 to 2012.[17]

137. The phenomenon of increased use and filing of IP rights seems to translate into aggregate growth, confirming the importance of intangibles in value creation. Corrado et al. (2009) develop an empirical approach to measure stocks of intangible assets and their contribution to growth in the United States over the period 1973 to 2003. They distinguish three broad groups of intangibles: computerised information, innovative property and economic competencies.[18] Their research shows that the business capital stock is significantly understated under traditional accounting practices; growth rates of output per hour are estimated to be around 10-20%higher when intangibles are included and the stock of intangibles is shown to have reached parity with tangible capital as a source of growth after 1995. Corrado et al. (2012) reproduce a similar analysis for European countries. Although European businesses are found to invest less in intangible assets compared to US businesses, the growth contributions of intangibles remain sizeable, thus confirming the increasing importance of intangibles for growth. Taken

together, these empirical contributions provide evidence that more digitalised enterprises are characterised by the growing importance of investment in intangibles which implies a substantial positive effect on firm value and output growth.

138. While the heavy reliance upon intangibles represents a common characteristic of digitalised businesses, the exploitation of intangible assets are becoming an increasingly important driver of value creation in all businesses, not just digitalised businesses.

2.5.3. Data and user participation

139. As highlighted throughout the business model case studies in Section 4 and in Annex 2.A, the fact that businesses are making increasing and more intensive use of data has allowed them to significantly improve their products and services. This has had positive effects on productivity growth.[19] Although with different intensities across business lines and companies, the use, collection and analysis of data is becoming an integral part of the business models of the most digitalised firms. As the process of digitalisation continues, these features can be expected to become an increasingly important part of the business models of an even wider range of firms.

140. Data analysis has often allowed firms to extract more of the consumers' surplus through pricing and, therefore, increase their potential profitability. In particular, benefits from data analysis are likely to increase exponentially with the amount of information linked to a specific customer. This effect is due to economies of scope: the more varied the information a dataset contains the more insights it provides. More comprehensive datasets allow digitalised businesses, for instance, to better target online advertisements to specific user groups. Worldwide transactions and direct interactions with a global customer base will become increasingly digital, implying that more firms will benefit from data collection, analysis and its potential monetisation in the future.

141. Some businesses monetise customer data directly by selling targeted online advertisements to customers on a different market side; other businesses use collected data primarily to improve their operations, product design or marketing activities. In some cases data collection and the subsequent accumulation of big datasets has also supported significant increases in firm value on the basis of the expected gains from data exploitation.

142. In order to understand how data can be a relevant component of the value creation process, it is important to understand the nature of the economic gains leveraged from these data. Following the results from the business case studies as well as previous analysis by OECD (2015d), this process can be described as a value cycle involving several interconnected phases:

1. Data origination: this phase involves the generation of digital data from online activities such as transactions, production or communication; it also includes user-generated content, i.e., active data origination by users or customers, and data generated from user behaviour through cookies. While it may be straightforward to collect or input digital data online, data on offline activities is increasingly being collected through sensors mounted on production machines, end-user products or other physical objects; the interconnection of such objects through the Internet - the Internet of things - is expected to further accelerate the ability of firms to collect data.
2. Data collection leading to big data: Data collection processes lead to increasing volumes of digital data being stored by private as well as public entities.

However, without further manipulation and analysis by businesses, the economic value of this type of big data is typically limited. While the data sources, i.e., the users or machines located in a specific jurisdiction, may not always be particularly mobile, the databases covering information on their characteristics, preferences, usage patterns and behaviours are digital and, therefore, highly mobile. Also, the source of data origination and the location of the database may not always be found in the same jurisdiction.

3. Data analytics: Processing, interpretation and analysis of the data is necessary in order to generate economic value. Its analysis is not linked to any specific location; digitalisation allows businesses to decouple the location of the data source from the location of data storage, analysis or deployment. Data analysis related to a specific jurisdiction can be carried out, for example, by highly skilled data scientists in another jurisdiction, generally the headquarters, or it can be automated by an algorithm.
4. Knowledge base: The knowledge accumulated through analytical activities becomes the basis for the economic value generated throughout the value cycle as described in the Annex for the case of e-commerce retailers using customer data to improve marketing and price differentiation. In addition, knowledge bases can be automatically updated or enhanced on an ongoing basis, for example, through machine learning processes.
5. Data-driven decision making: Knowledge gained through the previous phases, such as through data analysis, is used to inform decision making and is thus transformed into economic value.

User participation

143. As highlighted in Subsection 5.3, data and data analysis are becoming increasingly fundamental assets in business decision making. It is not new to see businesses analysing internal data coming from sales, inventories and production to optimise their processes and make more efficient decisions. What has changed with digitalisation is that users now play an increasingly significant role, their data being analysed by businesses to gain insights about markets and demand trends. This information can be used in making strategic inventory or product and services placement decisions, for example, or to create entirely new products and brands to address limitations in current supply offerings. Moreover, the analysis of customer data allows businesses to acquire significant competitive advantage by focusing on the improvement and personalisation of the user experience.

144. There are different views as to whether and the degrees to which customer data and user-generated content contribute to value creation. At one extreme, for social networks, user participation is a central feature of the business. Without user participation in the platform and without user-generated content, the business as we know it would not exist, although it has to be recognised that it is the platform developed through investment in information technology (IT) and intangibles such as algorithms that attracts the users. Users contribute with several types of content and by actively expanding the network (by adding friends). This and the detailed information they provide can be used to offer targeted advertising services. At the other extreme, for a vertically-integrated business the main interaction with the customer is the sale and purchase of a product. In this case, there is the possibility of data collection and user participation in the production process, but it is limited (although it will expand in the future) and less likely to contribute to the value creation process in a meaningful way. An intermediary position would be that of a

value shop process. In this context, user generated big data is more important for an accurate and sophisticated delivery of the product or service of the company.

145. These examples show how digitalisation has reshaped the role of users, allowing the possibility for them to become increasingly involved in the value creation process. This phenomenon occurs to different degrees of intensity depending on the type of business activities and the market conditions, also depending on how user participation and data are exploited.

146. Evaluating the intensity of user participation is a complex task since it involves a wide range of actions and interactions with many parts of a business. User actions can be of different types and can vary in their scope and importance. They range from bookmarking a page, watching a video or more actively writing a product review or inviting or adding friends to a network. Taking a closer look at distinct user activities and their value to businesses can be helpful in gaining a deeper understanding of the presence and extent of user participation, its relevance and intensity in the context of any given business and whether and the degree to which the user contributions add to the value creation process.

147. User participation can be divided in two broad categories: active and passive. Passive user participation does not necessarily require the user to enter any information but data is collected by the company, for example through cookies even after the user is no longer on the specific platform of the business but using other websites. Active user participation involves an explicit action. Data is actively created by a distinct user action and the content is limited to what the user decides to share. Users generally transmit information in exchange for services, products or other goods with express intention. Examples of active engagement range from bookmarking a page to creating and uploading a video or post. Both of these activities require the user to spend time entering information with varying levels of attention and interaction and in the latter cases the user's contribution is on a par with content that may well have been commercially sourced and paid for in the past under some traditional business models. They also bring value to the firm in different ways. To better characterise active participation, we define three broad categories where the participation can be low, medium or high depending on the value of the user action.

148. First, activities such as bookmarking, tagging and rating are different kinds of filtering actions and are the basis of recommendation mechanisms (like those that can be found, for example, on film and music streaming or e-commerce websites). They require a low amount of effort to be performed. A second and higher level of participation is needed for activities such as writing comments, reviews (e.g., TripAdvisor), taking and uploading photos and videos (e.g., Instagram, SoundCloud, Nice, Kuaishou or YouTube). In this case the user actively creates the content of the platform (i.e., user-generated content), helps other users to choose a product and increases trust in the platform. A third and most intensive form of user engagement involves actions to directly enlarge the platform by adding friends, creating communities and networking. This activity is extremely valuable for many social networks since more users will bring more data (including user-generated content) and, ultimately, more revenues. At the same time they contribute to the platform reaching a critical mass which is a major competitive advantage and hence, source of profitability.

149. Passive user participation, on the other hand, is characterised by the lack of direct activity by the user, although even the most passive contribution is likely to have involved some active steps, e.g., downloading an app, using a particular device or

providing consent for user data to be collected. Data collection is a by-product of the Internet and is gathered without the user's direct involvement or active transmission of the data. The best known example is the use of cookies to capture browsing activity, but it also extends to knowledge of the location, IP address or type of device in use. Generally, the aim is to capture user preferences and behaviours which can also be directly monetised, for example, when advertising is paid on cost-per-click or cost-per-impression basis.

Trust mechanism

150. As reported in OECD (forthcoming), ratings and reviews appear to facilitate trust in sellers and providers, and are one of the main drivers of customer trust in peer platforms. In other words, ratings and reviews build a trust mechanism. Some countries consider this an important driver of value creation. Customers value written reviews more than ratings alone and are likely to trust reviews when there is a critical mass of comments in relation to a specific product or service. These trust mechanisms and reputation systems are fundamental components of collaborative platforms. They help address potential concerns about the quality of the "product" and allow peer customers to make better -informed choices while making consumption decisions with otherwise incomplete and/or minimal information. The accountability of these systems has become crucial for many businesses, making the authenticity of user feedback highly valuable. Some companies, like Amazon, actively defend the integrity of their reviews by prosecuting fake reviews websites. In addition to having a critical trust-building function, these systems can also be a factor in regulating behaviour through monitoring, feedback-systems and the exercise of peer-pressure (Strahlevits, 2006).

User-generated content

151. User-generated content describes any form of content such as video, blogs, discussion form posts, digital images, audio files, and other forms of media that are created by customers or end-users of an online system or service and are publicly available to other customers and end-users. User-generated content is an extremely valuable asset to many businesses, since it attracts traffic, contributes to trust-building as discussed earlier, and in some cases, can represent the core of the business. For example, in its annual report for 2016, TripAdvisor describes its rich user-generated content as one of its key strengths and assets. It allows the firm to attract other users, create a community and convert visitors into repeat users that will in turn create more content and add greater value. Similar considerations apply to businesses such as Yelp where the vibrant community of contributors is described as the heart of the business. Each review, tip and photo expands the depth of the platform content, driving powerful network effects. On the other hand, it is also the platform, developed through investment in IT and intangibles such as algorithms that has an important role in attracting the users. Data and IT are intertwined in this regard.

User participation across business lines

152. Having broadly defined user participation and contribution, it is possible to obtain a suggestive characterisation of user participation intensities for some of the business lines and value creation processes described in the preceding sections. This analysis is by no means exhaustive and can only partially describe user participation in different businesses. Also, businesses belonging to the same category could have different characteristics, and therefore an in-depth evaluation of the facts, circumstances and

business model relating to any individual business is necessary to undertake a comprehensive classification. Rather, this exercise is carried out for illustrative purposes.

153. Figure 2.8 relates the intensity of user participation to different business lines. At the bottom of the scale, a business characterised by low user participation could be cloud computing together with a vertically -integrated business. Passive data is employed to a limited extent as are data provided by active participation. It is to be noted that data stored by the user in the cloud should not be considered user-generated content since it is generally not available for detailed analysis by the cloud provider (or only in circumstances strictly connected with the purposes agreed upon by the client) and it is either not shared or only shared among a few users. Of course, specific cloud computing businesses might have higher degrees of user participation, e.g., cloud storage providers like Dropbox or Weiyun, where users actively expand the networks/user base of the enterprise by inviting others to share files.

154. A business category featuring slightly higher user participation intensity would be a tangible goods e-commerce operator. Browsing data, reviews and ratings are employed to stimulate sales, customise services and improve customer targeting. On the other hand, intangible goods e-commerce operators could offer even more interaction opportunities and thus have higher participation intensity in comparison to tangible goods e-commerce. Users can increase the customer base by sharing their playlists (e.g., Deezer, Spotify or Tencent) or actively create content for online games.

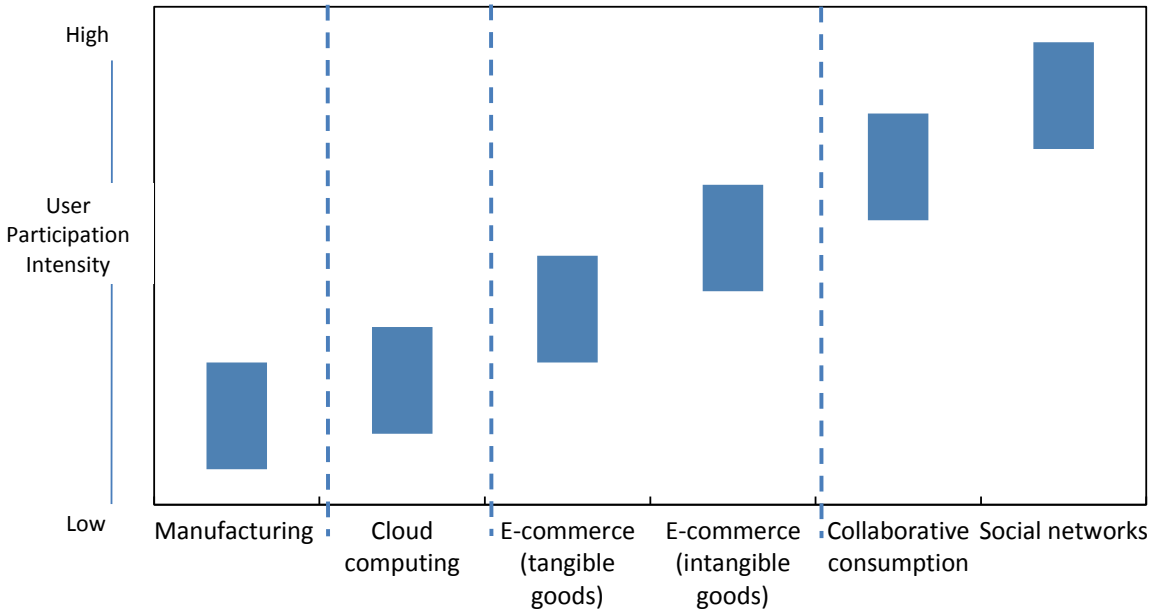
155. Collaborative consumption businesses are characterised by high user participation intensity. Much of the information provided passively may be essential to the delivery of the service and users must often disclose their preferences to access the services. (e.g., when searching for accommodation, information on desired city, size, budget and neighbourhood, etc., will be necessary to support the transaction). User-generated content is also important: users write reviews and share product or service descriptions often consisting of photos and different kinds of information, depending on the platform. As stressed before, reviews and comments are essential to building trust with the user base. Users often bear the burden of verifying the product quality (e.g., ratings of Uber and Didi Chuxing drivers or accommodation on Trivago and Booking.com).

156. Finally, social networks appear to be the most user participation intensive businesses: user participation is the essential feature of the service. The size of the user base and the users' level of engagement are critical to the success of these businesses and significant determinant of their financial performance. Social network users provide different types of user-generated content and actively expand the platform network. For platforms like Facebook or Weibo, for example, trends in the number of users affect revenues by influencing the number of advertisements they are able to show and their value to marketers. User activity and participation statistics are key indicators for such businesses. Annual reports and initial public offering documents often disclose information concerning trends regarding active users, and present metrics such as average revenue per user (ARPU) for different geographical areas to indicate the different monetisation rates and potential.

157. Figure 2.8 illustrates how the degree of user participation intensity of different types of businesses might be classified. It shows that the degree of user participation does not necessarily correlate with the degree of digitalisation: for example, cloud computing can be considered as a more highly digitalised business but one that involves more limited user participation. In other words, not all highly digitalised businesses are purely based on data and user participation to the same extent and for many of these businesses

other characteristics such as scale without mass are also important (e.g., cloud computing). As stressed before, the classification of business lines and value creation processes according to their user participation intensities presented here is not intended to be definitive, but is only intended to be suggestive.

Figure 2.8. Intensity of user participation



158. For some members of the Inclusive Framework on BEPS, the role of user participation represents a unique and important driver of value creation in digitalised businesses. This includes the collection of user data, both passively (such as on user preferences or behaviour) and actively (such as solicitation of user-generated content like reviews and posts). User data is then analysed by the business and may be employed to sell advertising targeted to the users or to customise the business's products and services to make them more valuable. In some cases, user contributions may be posted on the platform in a way that draws other users and increases the value of the platform, generating network effects. These countries point to the participation and sustained engagement of users which allows digital businesses to collect large amounts of data through the intensive monitoring of users' active contributions and behaviour. These countries also point to the contribution of content by users, which can be central to a digital business' offering and central to attracting other users and generating network effects. Finally, these countries take the view that user participation (e.g., reviews, provision of services) can play an important role in building up the trust and reputation of certain digital businesses and contributing to their brand and the growth of user networks.

159. In contrast, other countries view data collection from users, user participation, and the provision of user generated content as transactions between the users (as providers of data/content) and the digitalised business, with the digitalised business providing financial or non-financial compensation to the users in exchange for such data/content. That non-financial compensation could come in the form of providing, for example, data

hosting, email services, or digital entertainment. Countries that support this view agree that the interaction between users and the digitalised business is a transaction that could be subject to income taxation, although they also observe that income tax systems today rarely capture these types of barter transactions where there is no financial compensation (i.e., cash payment) on either side of the transaction. These countries do not agree that the action by the digitalised business to source data from users is an activity to which profit should be attributed to the digitalised business solely because the data acquired may be valuable. In this sense, the user's supply of data would not be different from other business inputs sourced from an independent third party in the business' supply chain (for example, data storage, broadband access, electricity). Nonetheless, some of these countries are of the view that user data may be recognised as valuable intangible assets of digitalised businesses and in that sense, may be considered as giving rise to the broader challenges identified above in relation to intangibles. However, there are other countries who do not view the provision of user generated content or the interactions between users and the digitalised businesses as barter transactions between users and digitalised businesses. On these questions, there is no consensus among countries.

160. Differences in views over whether and the extent to which data and user participation contribute to value creation will have an impact on whether there are considered to be tax challenges arising from changing business models, or whether those are unique to the application of international tax rules to digitalised firms, or whether any challenges apply to the international tax rules more broadly. Additionally, tax challenges may not arise for some digitalised businesses if such challenges are defined by purely referring to the reliance on data and user participation. Not all digitalised businesses rely upon data and user participation to the same degree.

161. In this context, further work may be needed to assess whether the different views can be reconciled in order to reach consensus on the extent of the long term tax challenges and, in turn, how long term solutions could be developed. The tax implications of the analysis on digitalisation, business models and value creation which is set out in this chapter, are considered in more detail in Chapter 5.

Annex 2.A. Digitalised business models

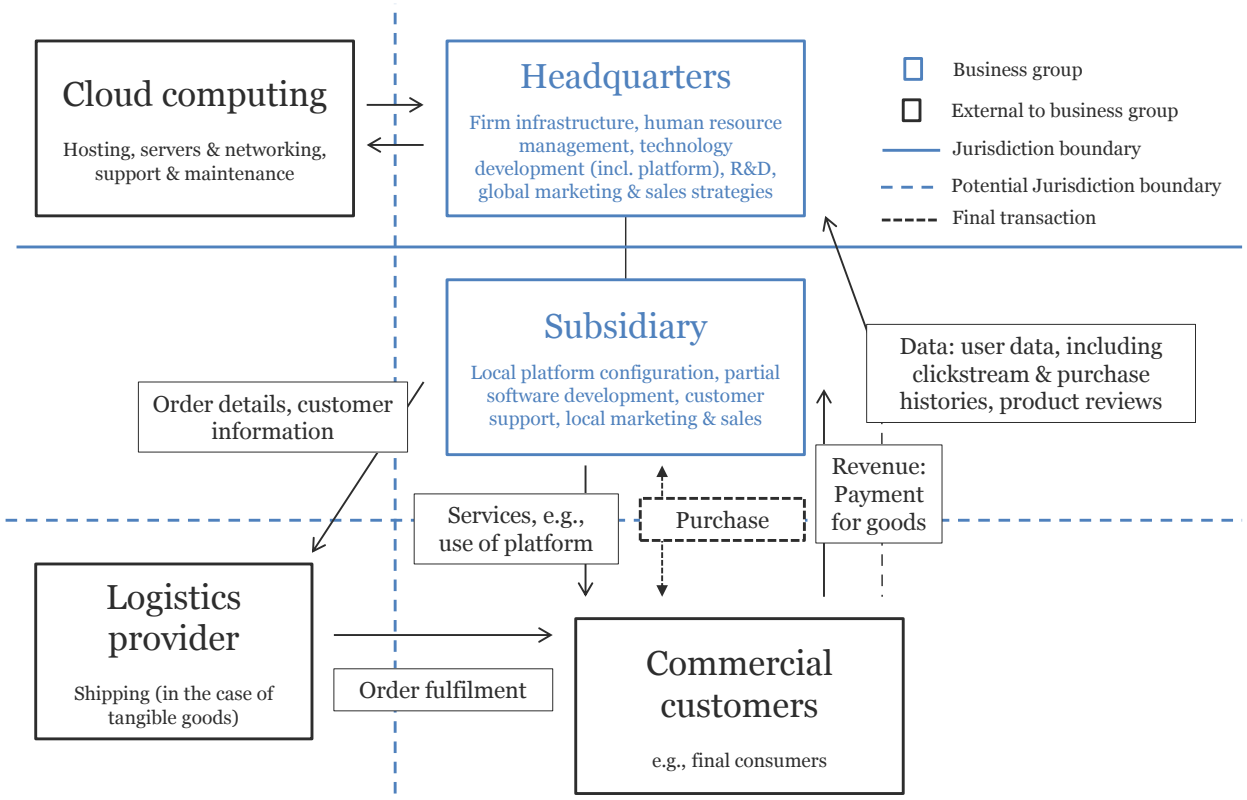
Value chain: Reseller of tangible goods

Business model overview

162. A reseller creates value by selling goods to final customers through an online store. The general value proposition is to resell goods purchased from input suppliers to final customers at a mark-up. The goods sold may be tangible (e.g., books) or intangible (e.g., digital downloads of music or software). A reseller's online store may exist with or without accompanying brick-and-mortar retail locations.

163. Annex Figure 2.A.1 illustrates the components of a reseller business model using a general schematic. The headquarter entity is responsible for the company's infrastructure (e.g., organisational structure, control systems), human resource management, technology development (including of the platform and the crucial IT infrastructure), research and development, as well as global marketing and sales strategies. The headquarter entity has a subsidiary located in a different jurisdiction (and likely multiple subsidiaries located in multiple locations). The subsidiary is responsible for local sales, either in its own jurisdiction or a proximate jurisdiction (in the case where the subsidiary serves a region). This may require a degree of local platform configuration, such as translation of the main website into the local language (or languages). The subsidiary handles interactions with final customers. Customers visit the company's website in their language, select items to purchase and submit user information such as an email address, a physical address for delivery of goods and payment details. The customer's order is then either filled by the subsidiary directly or handed to a third-party logistics company for fulfilment of the order. Local subsidiaries may engage in software development, as well as local customer support and local marketing and sales.

Annex Figure 2.A.1. Schematic of a general reseller business model



Revenue

164. The primary source of profit in a reseller business model is the mark-up on the sale of goods (tangible or intangible) to customers. Some resellers offer premium services, such as free incremental shipping on eligible items, via a subscription model (e.g., Amazon Prime). Resellers may also sell the customer data that they gather to third parties.

Use and Ownership of intellectual property

165. IP is an important value driver for many digitalised businesses, including resellers. IP rights are exclusive rights held by the owners of a variety of knowledge-based assets that qualify for legal protection under applicable IP laws. The main types of IP rights are patents, copyrights, design rights, trademarks, and geographical indications. Trade secrets are sometimes considered to be IP rights, too, though many countries do not expressly define them as such.

166. Reseller businesses often have trademarks, service marks, copyrights, patents, domain names, trade dress, trade secrets and proprietary technologies which are all crucial for the digital operations of the business. An online reseller would not exist without a platform supported by patents and proprietary technology. They may also sign confidentiality and/or license agreements with employees, customers, partners, and others to protect proprietary rights.

Data

167. Customers provide data when they interact with the company's website or app. The interaction may be active, such as when users create a profile, save items of interest for future reference or make a purchase. It may also be passive, such as when users browse the website or authorise the company to access their browser histories or geolocation data. It may also be possible for the company to access information via other websites or apps open at the same time. Such data collection, and the value that can be extracted from it through data analysis, is an important aspect of the reseller business model.

168. A reseller extracts value from customer data in two main ways. First, it may use personalised data such as demographic information as well as data about the customers behaviour and product use to understand customer preferences and, based on these preferences, improve their products and target their marketing at the individual user level. Online stores or apps may be tailored to each individual consumer. Second, a reseller may also use data to engage in differential pricing, charging customer different prices based on their personal information.

169. Little is publicly known about resellers' potential differential pricing strategies. While some companies have denied that they change prices based on personal information, however, anecdotal evidence is nevertheless plentiful (Mohammed, 2017). In a summary of evidence of price differentiation by US retailers, a 2015 Council of Economic Advisors report also outlined three categories of price differentiation strategies: (i) exploring the demand curve, i.e., conducting online experiments to learn about demand elasticities, (ii) steering and differential pricing based on demographics, and (iii) behavioural targeting and personalised pricing (CEA, 2015). To the extent that such strategies are employed, resellers are able to capture consumer surplus[20] for themselves by using data, thereby maximising profits.

Value chain

170. As described above, Porter's value chain is comprised of five primary business activities: inbound logistics, operations, outbound logistics, marketing and sales, and service. Annex Figure 2.A.2 shows the value chains for a traditional reseller (Panel A) and for a digitalised reseller (Panel B). By comparing traditional and digitalised retail business models across each of the primary activities of the value chain, the next paragraphs explore how the key elements of the traditional retail business model have changed with digitalisation.

171. In the value chain, the role of technology is to support each primary activity. This can be said of both the traditional economy and of the digitalisation of the economy. However, technology has taken on a position of paramount importance in the context of digitalisation. Given that the use and development of technology is a key source of competitive advantage amongst digitalised companies, we also consider the roles of technology in traditional versus digitalised business models for each primary activity.

Annex Figure 2.A.2. Value chain: A digitalised reseller's business activities compared to those of a traditional reseller

Panel A: Value chain of a traditional retail company					
	Inbound logistics	**Operations**	**Outbound logistics**	**Sales & marketing**	**Service**
Primary activities	• Source suppliers (of raw materials for production or finished goods) • Receipt & storage of supplies • Acquisition of real estate: factories, warehouses & retail stores Data collection: • Supply chain management data IP: • Network of suppliers, technology related to supply chain management	• Maintain inventory & payment systems • Potential manufacture of goods (if model is not to purchase finished goods) Data collection: • Inventory data IP: • Technology related to inventory management	• Transport of goods from warehouses to retail stores • Stocking of retail stores Data collection: • Data on transportation of final goods IP: • Technology related to inventory management & tracking of inventory	• Set retail prices • Advertising Data collection: • Consumer data through potential tracking of purchases • Market research • Data on competitors to aid price setting IP: • Technology related to tracking of consumer purchases	• Customer service support (e.g., returns) provided in-store Data collection: • Data on the quality of products & services (via customer surveys) IP: • Technology related to understanding consumer preferences
Technology	Telephone, fax, computing & database infrastructure to carry out purchasing	Telephone, fax, computing & database infrastructure to maintain inventory	Telephone, fax, computing & database infrastructure to track inventory & goods sold	Radio/TV/print advertising, telephone, fax, database of good sold & customers	Telephone, fax, database of customers
Panel B: Value chain of a digital e-commerce retail company					
	Inbound logistics	**Operations**	**Outbound logistics**	**Sales & marketing**	**Service**
Primary activities	• Source suppliers (of raw materials for production or finished goods) **globally** • Receipt & storage of supplies **globally** • Acquisition of real estate: factories &warehouses **(no retail space)** Data collection: • Supply chain management data **in real time** IP: • **Software to monitor supply chain** • **Potential IP on robots**	• Maintain inventory & payment systems • Potential manufacture of goods (if model is not to purchase finished goods) • **Platform development** Data collection: • Inventory data **in real time** IP: • **Development of website & algorithms to target consumers**	• **Receive & process internet orders globally** • **Assembly of orders & shipment to final consumers globally** Data collection: • Data on transportation of final goods **in real time** IP: • **Development of software to monitor outbound logistics**	• Set retail prices **where analysis of user data enables price differentiation** • Advertising **where analysis of user data enables targeting at individual level** Data collection: • **Definite** collection of consumer data through purchase histories & **browsing histories** • **Market research is implicit in the collection of consumer data** • Data on competitors to aid pricing IP: • **Development of algorithms to target customers** • **Development of algorithms to price differentiate**	• Customer service support (e.g., returns) provided **virtually** • **Online order tracking** • **Service improved by availability of product reviews** Data collection: • Data on the quality of products & services **maintained in customer review database** IP: • **Customer review database made public**
Technology	**Computer hardware; software; potential development of robots**	**Computer hardware, software, algorithms**	**Computer hardware, software, algorithms**	**Software, algorithms**	**Software, algorithms**

Inbound logistics

172. In many ways, the inbound logistics activities of a digitalised reseller are similar to those of a traditional reseller: both require the sourcing of products/suppliers; the receipt and storage of products to sell; and the use of warehouse facilities in which to keep inventory. However, there are also a number of differences.

173. The first difference is one of geographic reach: whereas a traditional reseller would generally operate and serve a customer base within a single jurisdiction or in a limited number of jurisdictions, the sale of goods online allows a digitalised reseller to directly reach customers globally. This, in turn, implies that a share of inbound logistics

activities be performed globally as well. For example, the sourcing of suppliers of final goods may be performed in both the headquarter jurisdiction as well as in market jurisdictions, particularly if the retailer aims to cater to local customer preferences.

174. In addition, a digitalised reseller that sells goods globally may arrange to have a portion of product inventory in or near market jurisdictions, which in turn may imply the presences of warehousing or fulfilment facilities in or near market jurisdictions. A final difference in inbound logistics is that, whereas a traditional reseller maintains a physical retail shop and thus requires retail real estate, while a digitalised reseller has a need for warehouse real estate, at least historically, there has been less need for "brick and mortar" retail stores. This allows the business to save on the fixed costs of retail real estate – through purchase or tenancy costs - as well as the variable costs of labour to run its retail operations.

Operations

175. As with inbound logistics activities, the operations activities of a digitalised reseller are similar to those of a traditional reseller: both must maintain inventory and payment systems, and engage in the potential manufacture of goods. The key difference is that a digitalised reseller faces the technological development of an online platform, the core of its operations and sales strategy.

176. The technological inputs that underlie the platform – computer hardware and software, software engineers, website designers, algorithms and intellectual property more generally – are each key investments for a digitalised reseller, whereas these inputs are of limited relevance in the traditional reseller context. Some digitalised resellers undertake this capital investment themselves, while others may outsource these functions (e.g., through a cloud computing company). In either case, technological development is a key aspect of the business model.

177. Inventory management is generally similar for both, though for a digitalised reseller the principal concern relates to warehoused goods (instead of inventory in both warehouses and retail stores). Regarding the maintenance of a system to receive payments, as payments to a digitalised reseller are entirely electronic, there is no need to arrange for the periodic physical transport of cash and checks to the bank. Inventory and payments systems may be maintained in the headquarter jurisdictions or in the regional headquarters.

Outbound logistics

178. The main outbound logistics activities of a traditional reseller include transporting goods from warehouses to retail stores and stocking retail stores. In contrast, neither of these activities is necessary for a digitalised reseller. Goods are sold directly from the company's network of warehouses without need to house stock at a retail space.

179. A digitalised reseller receives orders from customers via its online platform, where requests may be placed from any foreign, non-headquartered jurisdiction in which the company has a commercial presence. Though a digitalised reseller need not maintain retail stores in market jurisdictions, it most likely still requires warehousing facilities and employees that work to fulfil orders. While digitalised resellers have generally employed many warehouse workers, warehousing tasks are expected to become increasingly automated in the future.

180. As customers typically leave retail stores with their purchases, outside of those businesses where home delivery has accounted for a reasonable share of their trade, there has generally been no need to arrange for outbound shipment. In contrast, the assembly of orders received on the Internet and shipment to final customers is a key feature of a digitalised reseller's business. Assembly and shipment is processed at fulfilment centres, which exist in countries around the world and can make extensive use of robotic technology to manage the receipt, storage, collection and shipment of products. For the shipment of products, digitalised resellers may rely upon third-party delivery companies. However, they may also operate their own delivery businesses.

Sales and marketing

181. As mentioned above in the discussion of how consumer data is used in a retail context, the sales and marketing activities of a digitalised reseller differ from those of a traditional reseller in several important ways. Whereas traditional resellers collected data about their potential consumers from previous orders and market research surveys, Internet browsing leaves a digital trail of information that is far richer than what was available previously because this data is much more expansive in its scope and can be gathered in real time and in vast quantities. The data captured by digitalised resellers is also of higher quality because it all pertains to the patterns of behaviour and preferences of individual users. The use of this data creates several key differences between digitalised and traditional reseller models.

182. The first key difference relates to the setting of retail prices. A digitalised reseller always has the potential to price differentiate using data on product supply and consumer demand, where consumer demand for a given product may be assessed by analysing users' purchase and clickstream histories. Price differentiation may allow a digitalised reseller to transact at the maximum prices that consumers are willing to pay.

183. A digitalised reseller may price differentiate at the individual level, whereas traditional resellers could only differentiate very roughly, for example, by age through the offering of discounts for different age groups (e.g., discounts for seniors). Whereas a traditional reseller affixes physical price tags to each and every product in inventory, a digitalised reseller can change prices digitally. The ability to adjust prices in real-time may allow the firm to capture more consumer surplus relative to a traditional reseller by price differentiating with greater frequency.

184. The second key difference relates to the marketing activities. An important aspect of a digitalised reseller's business is its ability to analyse consumer information in a way that allows for the tailoring and targeting of the advertising to the preferences and behaviour of the individual consumer. Whereas traditional resellers tended to rely on advertising that blanketed a more general audience (e.g., print, television, billboards), a digitalised reseller can embed advertising in specific webpages that consumers visit, whether on its own site (e.g., by offering tailored versions of its website to each visitor) or elsewhere on the web (e.g., more traditional paid advertising). While online advertising offers the advertiser the ability to target its advertising dollar with greater precision, the cost structure of such advertising generally involves a "pay per click" approach, which ensures that the advertiser only pays when a consumer has actively acknowledged the existence of the advertisement, These features ensure that online advertising is capable of delivering advertisers with a much more valuable product than their traditional counterparts.

185. To some extent, data analysis and targeting of this kind has an equivalent in traditional retail: resellers may capture data on individual consumer's purchase histories, for example through loyalty cards, and analyse past purchases in order to recommend products in the future (along with price differentiation). However, these approaches have been much more limited in the context of the traditional business models and there are still substantial differences in a digitalised reseller's ability to analyse user data in that the company systematically collects and analyses a large amount of data as a way to continuously improve its business and its value. In particular, through the capture of clickstream data, a digitalised reseller is able to monitor each and every product that a consumer browses (without necessarily purchasing).

186. To the extent that a digitalised reseller can identify desirable items not purchased, it can exploit this information by promoting or offering those items at lower prices, thereby transacting at the maximum price that a consumer is willing to pay for each item. Internet browsing leaves a digital trail, which is useful for understanding consumer preferences, and computing power has enabled rapid analysis and tailored marketing (including pricing) in real-time. Moreover, data analysis happens in real time, allowing relevant product suggestions to appear as a customer is browsing.

Service

187. The customer service activities of a traditional reseller would consist of in-store personnel support, for example, in processing returns. Such support is more likely to be provided electronically by a digitalised reseller in the form of email correspondence or online chat sessions, but is otherwise not markedly different. One key difference of a digitalised reseller is the maintenance of an online review system in which users offer advice to one another concerning a recent purchase.

Technology

188. While technology development is categorised as a support activity of a value network rather than as a primary activity, we also compare the two business models along this dimension given the importance of technology in the digitalised economy. Indeed, technological infrastructure is a key input into a digitalised reseller's business, requiring substantial upfront investment and expertise.

189. A key piece of a digitalised reseller's business model is its platform, which allows the company to replace a network of physical retail stores with a single online store that may be adapted to each individual consumer. The fact that the retail space exists online allows the company to tap into a wide-ranging and rich stream of user data available digitally and to analyse it in order to better target its products to the needs of its customers. These abilities rely on sophisticated technology, software and algorithms, each of which is a key source of value and competitive advantage of a digitalised reseller.

Value network: Ride-for-hire company

Business model overview

190. In general, a ride-for-hire business model can be described as a digital platform that creates value by matching drivers and passengers so that they can complete a ride on a pay-as-you-go basis. It is built around the following main steps. First, the ride-for-hire company recruits drivers with access to their own cars. It then orchestrates the drivers centrally, e.g., monitors their active hours and locations in order to offer a transportation

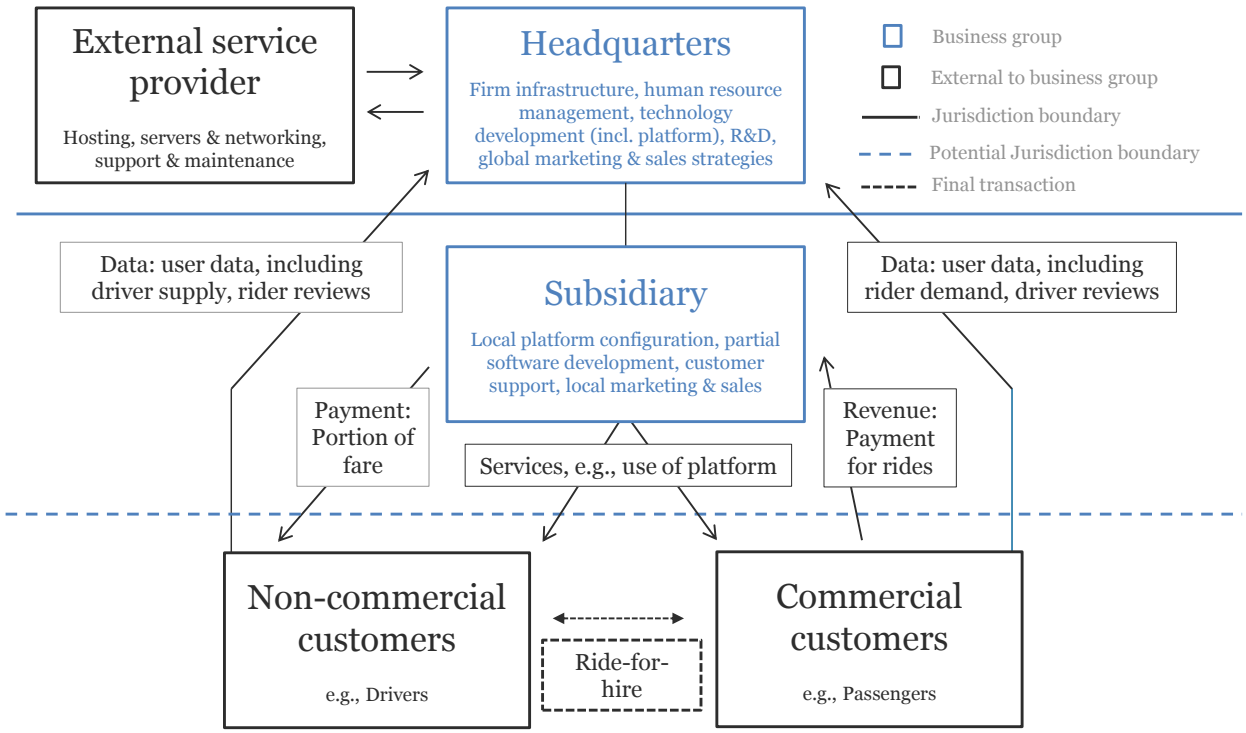
platform. Third, the company develops a platform, including a mobile app, which allows passengers to book a ride. Finally, it ensures transaction quality using a review system whereby drivers and passengers have the option of rating the quality of the interaction.

191. Annex Figure 2.A.3 illustrates the business model. The headquarter entity is responsible for the company's infrastructure (e.g., organisational structure, control systems), human resource management, technology development (including of the platform), research and development, as well as global marketing and sales strategies.

192. The platform is provided to an entity for use in another location (likely for a fee, though the details of this potential remuneration are not known). The entity may provide local services, such as local configuration of the platform and partial software development. The local version of the platform is used by non-commercial customers (i.e., the drivers) as well as commercial customers (i.e., the passengers). The final service takes place between the passenger and the driver, with payment sent electronically from the passenger to the ride-for-hire company.

193. Ride-for-hire companies generally rely on an external (i.e., cloud computing) service provider for hosting of the app, storage of data and other computing services such as the running of data analysis algorithms.

Annex Figure 2.A.3. Schematic of a ride for hire business model



Revenue

194. A ride-for-hire company's primary source of revenue is the sum of commissions earned on rides, which depending upon the fee structure of the business, could be as high as 20 or 30%of the total transaction. In most cases, the price of a ride is set dynamically based on the supply of drivers and the demand of passengers in a given location (e.g.,

Didi Chuxing, Lyft, Ola and Uber), although in some cases (e.g., BlaBlaCar) the price is set based on an estimate of the costs incurred by the driver. In order to use the company's app, a passenger must provide his or her credit card details so that he or she can be automatically charged for the fare when a ride ends. Revenue may also be earned through other, complementary business lines, such as food delivery platforms (e.g., UberEATS).

Use and ownership of intellectual property

195. A ride-for-hire company may own various patents and trademarks to protect its intellectual property together with app icons and app designs. The patents are often utility patents, which mainly relate to business methods. Examples of utility patents include those on translated view navigation for visualisations and systems and methods for providing dynamic supply positioning for on-demand services. Ride-for-hire companies may also have trademarked logos, app icons and app designs. Patents and trademarks may be held by the headquarters or by foreign subsidiaries.

Data

196. User data, of both drivers and passengers, is a key input of the service provided by ride-for-hire companies. A vast amount of data will be stored, such as ride history, including origin and destination, payment details and basic user information, such as name, phone number and email address, which can be analysed to help the company tailor its services and pricing. For example, user location is important in enabling the ride-for-hire service as driver-passenger matches are made according to the optimal locations of all drivers and passengers in the network.

197. The user data collected also serves as an input into the company's surge pricing algorithm, which sets the price of fares according to driver supply and passenger demand in real time. This enables the company to extract consumer surplus via first-degree price differentiation known as personalised pricing: setting tailored prices for the same good (Shapiro and Varian, 1999).

198. Under surge pricing, higher passenger demand for a given supply of drivers prompts fares to rise. A passenger either accepts to ride at the higher fare or may wait until the fare declines to match his or her reserve price. In this way, surge pricing enables ride-for-hire companies to transact at the maximum price a passenger is willing to pay, thereby transforming consumer surplus into revenue. This pricing strategy is common for firms that operate as multi-sided platforms that link buyers and sellers (Rochet and Tirole, 2006).

199. Finally, user data is used to improve the service. Drivers and passengers review each transaction, and user reviews are aggregated into a rating that the company can use to quality-assure its network. The company may also analyse user data in order to provide an improved service, for example by offering inducements to drivers to get on the road at the relevant time interval(s) and in the relevant location(s). The road traffic data collected, for example, on the length of the driver or the number of passengers at a certain time may have commercial value for other businesses such as logistics or public transport companies.

Value network

200. As described, the value network is comprised of three primary business activities: network promotion and contract management, service provisioning and network

infrastructure operation. Annex Figure 2.A.4 shows the value network activities for a traditional taxi company (Panel A) and for a digital ride-for-hire company (Panel B). The following paragraphs compare the two value networks as a means of exploring how this business model has changed with digitalisation.

Annex Figure 2.A.4. Value network: A ride for for-hire company's business activities compared to those of a traditional taxi company

Panel A: Value network of a traditional taxi company			
	Network promotion & contract management	**Service provisioning**	**Network infrastructure operation**
Primary activities	Drivers: • Recruitment spanning a limited geographic area • Verification of permission to drive – local • Good driving record • Agreement to labour contract Passengers: • No passenger requirements/vetting Data collection: • Driver database IP: • None	• Drivers/passengers matched in person/by dispatcher • Driver & passenger complete a ride - locally • Passenger pays in cash or by credit card • Driver earns sum of fares less commissions • Fares set in compliance with local regulations Data collection: • Record of completed rides IP: • None	• Cars owned & maintained by company or drivers • Vehicle standards set by regulation Data collection: • Minimal storage of user information IP: • None
Technology	Telephone	Radio network linking drivers &/or dispatcher; electronic payment technology	Telephone, fax
Panel B: Value network of a digital ride-for-hire company			
	Network promotion & contract management	**Service provisioning**	**Network infrastructure operation**
Primary activities	Drivers: • Recruitment **globally** • Verification of permission to drive – **global** • Good driving record • **Acceptable driver rating** • Agreement to labour contract Passengers: • **Global passenger base** • **Passengers must provide credit card** • **Acceptable passenger rating** Data collection: • Driver **& passenger** database • **Storage of user profile data, including ratings** IP: • **Development of ratings algorithms**	• Drivers/passengers matched **by app** • Driver & passenger complete a ride - **globally** • Passenger pays **through app** • Driver earns sum of fares less commissions • Fares set **using a supply-demand algorithm** • **App updates pushed to all users as relevant** Data collection: • **User locations in real time** • **Passenger credit card data** • **Driver bank information** IP: • **Running of algorithms to match users** • **Running of algorithms to set fares**	• Cars owned & maintained **by drivers** • Vehicle standards **set by company** Data collection: • **User data, including driver & passenger locations in real time** IP: • **Development of app & platform** • **Development of algorithms to match users & set fares**
Technology	**App, platform, algorithms**	**Software, app, algorithms**	**Computer hardware, software, app, algorithms**

Network promotion and contract management

201. Network promotion and contract management is the category of business activities associated with inviting potential customers to join the network, selection of customers that are allowed to join and the initialisation, management, and termination of contracts governing service provisioning and charging. Initialisation, management and contract management must be done for both commercial and non-commercial customers.

202. A clear similarity between the network of a ride-for-hire company and that of a traditional taxi company is that they both require drivers (although this is likely to change

with the anticipated arrival of driverless cars) with an available vehicle and passengers. Both a ride-for-hire company and a traditional taxi company require proof that the driver is qualified and capable of driving according to local regulations. Drivers must also agree to a labour contract with the business, and driver contract management may look rather similar for a ride-for-hire company and a traditional taxi company. However, there are several striking differences.

203. One difference is that, while there are no hurdles to becoming a traditional taxi passenger, a ride-for-hire company's passengers are required to have the company's app and therefore to reveal their identity to both the driver (by their name and phone number) and the company (by their name, phone number and credit card). As a result of having user-specific information, ride-for-hire companies are able to build profiles over time of both drivers and passengers based on their location, ride histories, willingness to pay premium prices and ratings. Whenever drivers and passengers complete a ride, each is prompted to rate the quality of the interaction. Ratings are aggregated into a score that ride-for-hire companies use in order to maintain the quality of their networks (of both the drivers and the passengers). Whereas any individual can take a taxi ride, only passengers with positive ratings can use the app and thus the service; and whereas any qualified driver can operate a taxi, only drivers with positive ratings can use the app and thus the service. The quality assurance of the ride-for-hire company's network represents value created by the digitalisation of a traditional business model.

204. Another difference between the network of a ride-for-hire company and that of a traditional taxi company is the former's far greater scale, both in terms of geographic span and number of drivers. A ride-for-hire company is able to maintain a network of drivers and passengers on a global basis. To become a ride-for-hire driver, an individual needs to provide: a driver's license (verified by the company locally or by a third party); an acceptable vehicle (though drivers may also rent vehicles from the company or third party companies); appropriate license plates for the vehicle; and proof of commercial insurance for the vehicle. Beyond these steps, all that is required is the company's app. In most countries, traditional taxi drivers need to meet much more stringent regulatory requirements including often having to pass a specific exam before they can work start working in the industry. This allows the company to recruit and contract work to a great number of drivers, with fewer barriers to entry and without having large management operations in the locations where final transactions take place or employing a substantial number of workers there. The fact that ride-for-hire companies are able to maintain networks of drivers globally is another source of value, as a passenger can use the service to which he or she is accustomed almost anywhere in the world.

205. Similarly, on the passenger side, an individual need only download the app and provide a means of electronic payment within it. Ride-for-hire companies are able to build consumer bases through the transmission of data and without the presence of employees or management in non-headquarter jurisdictions.

Service provisioning

206. Service provisioning is the category of activities associated with establishing, maintaining, and terminating links between customers and billing for value received, where billing requires measuring customers' use of the service.

207. The activity of a driver providing a ride to a passenger is comprised of three main components: (i) the driver and the passenger must be matched; (ii) once matched, they complete a ride; and (iii) the passenger pays for the ride. While both traditional and

digitalised business models share these components – a passenger is clearly taken from point A to point B in a hired car in both cases – they achieve this objective in different ways.

208. In the most basic version of a traditional taxi business model, the passenger/driver match is unaided by technology or an intermediary. The entire transaction takes place in a single jurisdiction, with no or very little transactional data stored. The transaction is settled between the passenger and the driver directly.

209. In a slightly more advanced version of a traditional taxi business model, a passenger can arrange a taxi ride by phone.[21] In this case, the driver and passenger are matched by an intermediary, such as a dispatcher. The match no longer happens physically and, indeed, the ride need not take place in the same location as the dispatcher. Nonetheless, driver-passenger matches require human labour, and are thus not infinitely scalable.

210. Some data may be stored, such as the passenger's address and phone number. The data may be used to establish a client record for future use, but is likely not analysed systematically and on a large scale. The price of the ride is set according to a fixed schedule that may vary by time of day (e.g., rush hour surcharge). The transaction may be settled between the passenger and the driver directly. Alternatively, electronic payment for the ride may be routed to the company before the driver receives his or her share.

211. In contrast to taxi companies, a digitalised ride-for-hire company makes passenger-driver matches with the app or platform using real-time user data, mapping technology and algorithms. Compared to a traditional taxi dispatcher, the ride-for-hire platform is vastly more technologically advanced. It inputs data pertaining to passenger and driver locations in a given area, and the company's algorithms rapidly and efficiently match passengers and drivers into pairs. The platform is able to process many matches simultaneously, which makes it easily scalable.

212. A ride-for-hire is initiated by a passenger through the app. The company inputs user data – current location as well as destination – into its algorithm in order to match the passenger with a nearby driver. Once a match is made, each party's information is made available to the counterparty, after which the driver arrives at the location specified by the passenger and the digital match becomes a physical match. Passengers are given precise estimates regarding when their drivers will arrive, and can spot them on a map if their arrival location is imprecise. Likewise, drivers can spot whether passengers have deviated from the agreed-upon pick-up location. It is clear that in this context, the IT infrastructure and the synergy between data and algorithms are major drivers of value creation.

213. Users may download the app from anywhere for use in any jurisdiction in which the company operates. Thus, as with a taxi ride arranged by a dispatcher, the driver-passenger pair and the platform need not be in the same location. What is different with ride-for-hire companies, however, is the scale at which driver-passenger matches can be made with limited human intervention. The number of matches is only limited by computing power, and can be done with speed and efficiency around the world. Regarding payment for a ride, the payment mechanisms of the two business models are similar if we compare a ride-for-hire company to a traditional taxi company that collects payment from passengers electronically before disbursing a portion to the driver. The transaction is not settled between the passenger and the driver but between the passenger and the company via the payment information provided through the app.

214. Finally, there are also differences in the provisions of customer service between a ride-for-hire company and a traditional taxi company, chiefly because the former's collection of data – user information as well as transaction reviews – put it in a position to analyse that data and respond to customers' feedback and needs. Additionally, all transactions are electronically recorded and the passenger systematically receives a receipt for the transaction by email.

215. By differentiating between passengers based on their needs and/or preferences, ride-for-hire companies can capture more consumer surplus, a form of second-degree price differentiation known as product versioning or menu pricing. However, a variety of price discrimination existed in the traditional taxi business model. Different vehicle types existed previously (e.g., small car or van), as did private car services that allowed customers to differentiate by car class by paying a premium (e.g., business car or limousine).

Network infrastructure operation

216. Network infrastructure operation is the category of activities associated with maintaining and running the firm's physical and information infrastructure. The traditional and the digitalised business models are similar with respect to physical infrastructure in that they each rely on physical vehicles, owned and maintained either by the company or the drivers. However, there are clear and striking differences between the two. First, as explained in Section 2, it is typical of a multi-sided platform that the control rights and liabilities towards customers are retained by the suppliers of the service, in this case the drivers. This implies that the platform matching drivers and passengers outsources to the drivers the risks associated with vehicle purchase, maintenance costs, and periods of latent use. This is an additional source of competitive advantage. The second important difference with the traditional tax business is the ride-for-hire company's substantial information infrastructure compared to a traditional taxi company's very limited information infrastructure.

217. A ride-for-hire company's information infrastructure has several aspects. First, its service depends upon data describing the precise locations of drivers and passengers, so that efficient matches can be made by a computer algorithm. Second, the company collects and stores user data, including ride history, user profile details and payment or bank information, which leads to product development and an ability to maintain the quality of its network. In addition, ride-for-hire companies use user data as an input to a sophisticated price-setting algorithm. In a traditional taxi business model, fares are set according to a schedule (sometimes set by government regulation) that often varies with time (e.g., during rush hour) and will be affected by the levels of traffic and the time taken to complete the journey. While some of these factors still affect the pricing of ride-for-hire companies, they have also relied upon surge pricing, wherein an algorithm sets fares in real time according to some of the traditional factors (e.g., traffic and anticipated length of the journey) as well as the supply of drivers and the demand of passengers in a given geographic area at a given point in time.

Technology

218. A clear difference between the two business models is a ride-for-hire company's development of its platform, which forms the core of the company's operations by connecting passengers and drivers using Internet connectivity and running the algorithms by which the company sets prices. The technological inputs that underlie the platform are

each key and substantial investments, whereas these have been much less important for the traditional taxi company. While this has a physical aspect: computer hardware, servers, etc., it also has a knowledge-based capital and intellectual property component: software, software engineers, algorithms, etc. Reflecting this stark difference between the two business models, the question of whether ride-for-hire companies should be classified as transport companies or as digital service companies is a matter of continuing debate.

219. Core technology services may be outsourced to third parties (e.g., cloud computing firms). A ride-for-hire company may rely upon other service providers (e.g., Google maps for its location data) and to enable users to view one another's precise location in the app.

220. The only technology required by a traditional taxi company, in contrast, is a potential radio communication network linking drivers and/or drivers and a taxi dispatcher, and the potential storage of user information (e.g., name, phone number, address) in order to service repeat passengers.

Value shop: Cloud computing

221. We describe cloud computing as an example of a value shop. The choice of cloud computing as a case study rests on the observation that this business model seems to be fundamental in accelerating the digitalisation of other businesses and, therefore, of the entire economy.

Business model overview

222. A cloud computing business creates value by providing a broad set of on-demand computing services to customers. The services are generally supplied in a standardised and highly automated way and, as explained in more detail below, they can be broadly classified as infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS) and software-as-a-service (SaaS).

223. Cloud computing enables a range of technology-based business activities to take place on a network of remote servers hosted on the Internet rather than on a local server or a personal computer. This enables businesses – both small and large – to outsource certain activities. By relying on cloud computing, customers do not have to make large upfront investments in hardware, releasing resources for their core business. By lowering the cost barriers to entry, cloud computing can facilitate market entry for start-ups and smaller players which usually lack the financial and/or technical resources to build their own infrastructure.

224. Instead, they can provision the right type and size of resources they need and access them on demand. For example, without cloud computing services, an individual company must maintain its own computing capability sufficient to handle a maximum load: an e-retailer would need to maintain computing capabilities large enough to handle substantial spikes in site traffic, for example during the holiday season, although the computing need would be much lower throughout the rest of the year.

225. Additionally, through the cloud, companies can access the most recent technology as cloud devices can be constantly updated remotely. These benefits are driving the rapid adoption of e-cloud services across various sectors of the economy, allowing companies to become more and more digitalised and to leverage digitalisation to grow.

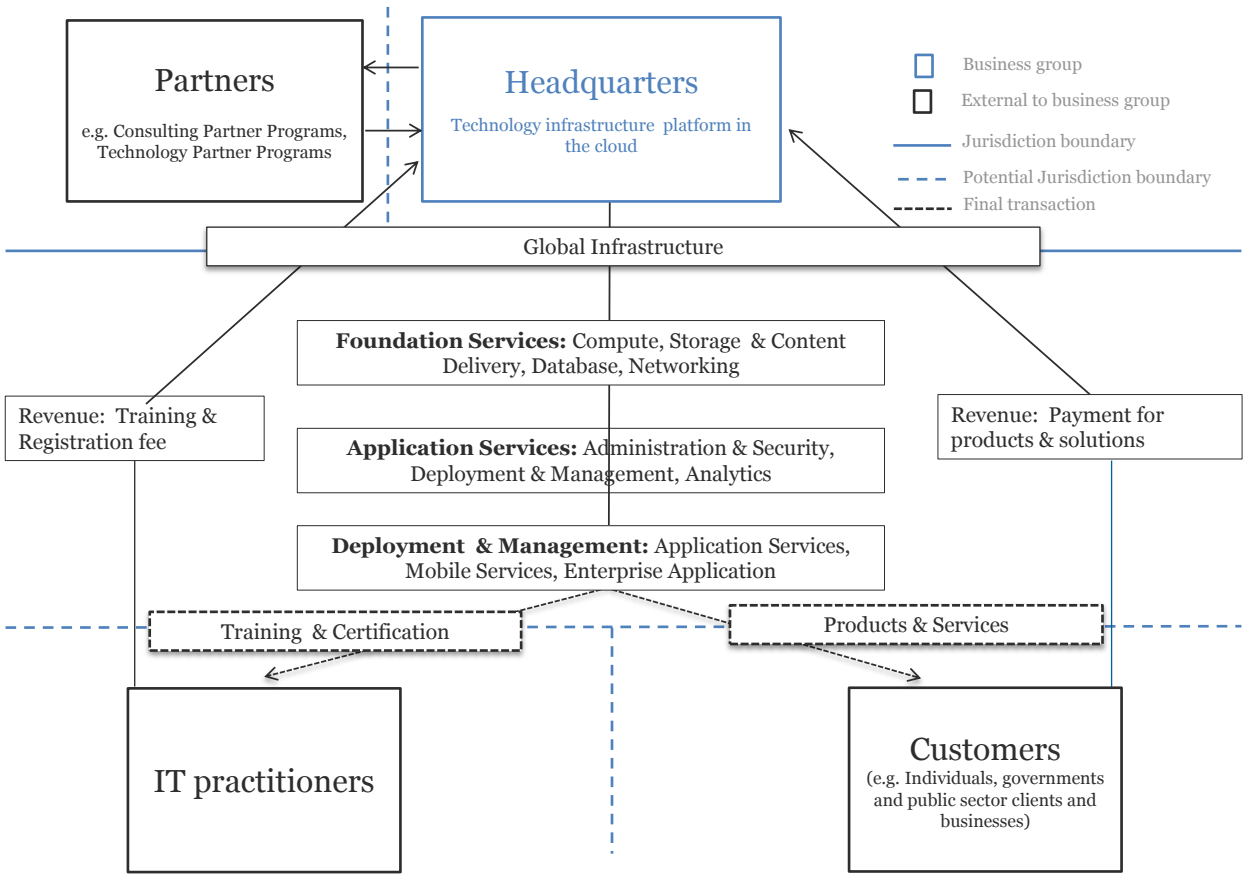
226. Computing services include virtual servers in the cloud, the ability to run and manage web apps using remote computing, the ability to run code on remote computers in response to events and the ability to run batch code jobs at scale. Storage services include storage in the cloud and data transport.

227. Database services include data warehousing, database management and caching systems. Migration services include database migration and data transport (with a possible physical component). Networking and content delivery services include access to a virtual private cloud (an isolated cloud that the customer can control) and use of a global content delivery network (whereby content such as videos are transferred to viewers at high transfer speeds).

228. Two publicly known examples of cloud computing customer case studies are Airbnb and Spotify. One year after Airbnb launched, the company migrated its computing services to Amazon Web Services in order to gain flexibility in server usage. Amazon Web Services enabled Airbnb to achieve scale extremely rapidly: the number of Airbnb guests went from 4 million in January 2013 to 15 million in June 2014. Airbnb uses Amazon Web Services for its application, memory caching (used to speed up database-driven websites by caching data in storage, thereby reducing the number of times an external data source must be read) and search servers. Airbnb also uses Amazon Web Services to house backups and static files, including 10 terabytes of user pictures, among other services. Spotify relies on Amazon Web Services to store the company's huge volume of music content while remaining accessible to users of the Spotify website and mobile application worldwide. In addition, Spotify relies on Amazon Web Services CloudFront to deliver the Spotify application and software updates to users.

229. Annex Figure 2.A.5 illustrates the general business model schematic for a full-service (i.e., providing IaaS, PaaS and SaaS) cloud computing company. In general, a full-service cloud computing company may group its services into three broad categories: foundation services, application services and deployment and management services. It markets and sells its services to customers in exchange for payment, which generally entails an ongoing relationship as the cloud computing services integrate into the technological fabric of the clients' operations.

Annex Figure 2.A.5. Schematic of a cloud computing business model



230. Cloud computing companies may run programmes for certain customers in order to support their business models with additional consulting and technology support. Such programs are meant to encourage high-profile users to develop and promote their services. Cloud computing companies may also offer training and certification programs to help customers build knowledge and technical skills. Participants pay fees for training courses and registration fees for the exams that grant certification.

Revenue

231. In cloud computing business models, revenue is generated through the global sales of services. While the pricing strategies of cloud computing services vary, a key appeal to customers is that services can often be consumed on a pay-as-you-go basis, which allows them to pay for what they use without upfront expenses or long-term commitments. Some cloud computing companies have stated that their strategy is to prioritise infrastructure innovation in order to keep costs down, viewing cloud computing as a high-volume, low-margin business.

Use and ownership of intellectual property

232. The creation of proprietary computer hardware, network infrastructure, software and algorithms is a key source of competitive advantage for a cloud computing company. Cloud computing companies own various IP assets.

Data

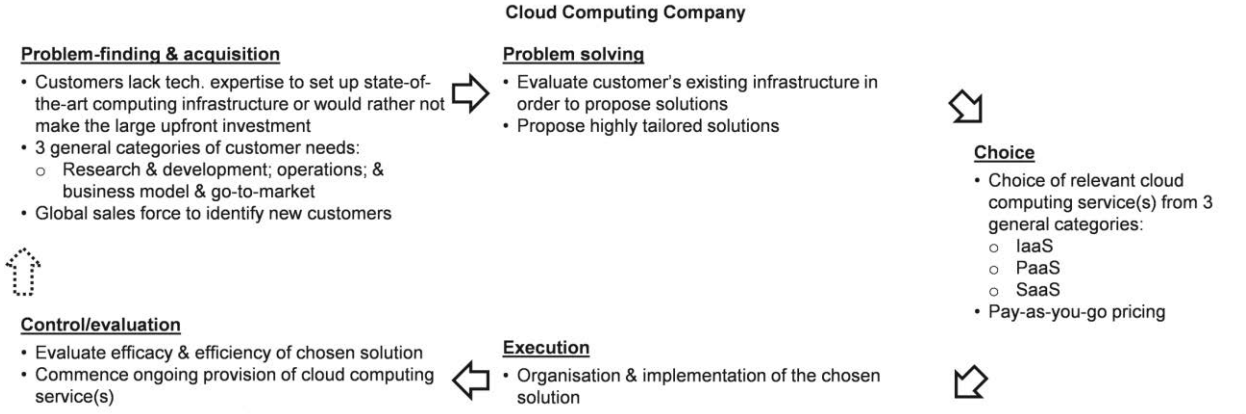
233. Apart from the storage of customers' data on servers, a cloud computing company makes limited use of data because ensuring the confidentiality of all information entrusted to the company is a key customer concern. The exception is when some companies help their customers develop better insight through their analysis of customer data – where the customers provide their consent.

Value shop

234. As described, the value shop is comprised of five primary business activities: problem-finding and acquisition, problem-solving, choice, execution and control and evaluation. Whereas the value chain or value network overviews compared highly digitalised business models to their traditional counterparts, it is difficult to imagine the traditional counterpart of a cloud computing company.

235. Of all of the business models surveyed, the cloud computing business model is the one that appears truly new. The next paragraphs explore the business model according to the value shop framework described earlier, which is illustrated in Annex Figure 2.A.6, on its own and not in comparison to the pre-digital world.

Annex Figure 2.A.6. Value shop: Cloud computing business activities



Technology		
ICT	**Data collection**	**IP**
• Investment in or access to electricity grids • Investment in hardware required to support network infrastructure & computing power	Limited	• Patent on operating system & software apps (e.g., Office 365)

Problem-finding and acquisition

236. As previously noted, problem-finding and acquisition is the category of activities associated with the recording, reviewing, and formulating of the problem to be solved and choosing the overall solution approach. Problem-finding and acquisition have much in common with the marketing and sales activity in the value chain: identifying a customer need and applying resources towards solving it. Depending upon the geographic scope of their operations, cloud computing companies generally maintain regional or global sales forces geared at acquiring customers, which include governments and other public sector clients, individuals and corporations.

237. As mentioned, some cloud computing companies' stated sales strategy is to gain market share by keeping prices low in order to boost volume. Another means of attracting customers is through a pricing strategy: pay-as-you-go pricing allows smaller businesses, in particular, to scale rapidly without large upfront costs. In this way, cloud computing services support the digitalisation of the economy and the emergence of more highly digitalised businesses with the characteristics referred to earlier: economies of scale and the ability to build large, often cross-country networks. Clients can achieve operational scale without mass, since they do not need to invest in their own IT infrastructure. Additionally, they achieve the ability to conduct business across jurisdictions with ease, as cloud computing services are already available in most regions around the world and they can be provided wherever there is Internet connectivity.

238. The problems serviced by cloud computing companies are plentiful in the digitalised economy: their services span nearly all technological infrastructure needs of businesses, from server space to database management to application services.

Problem-solving

239. Cloud computing firms generally offer services according to the following main categories:

- Infrastructure-as-a-service (IaaS): IaaS refers to the delivery of infrastructure such as computing capacity. Also known as hardware-as-a-service, IaaS encompasses all of the physical computing resources that support delivery of applications as a service, such as computing services, database storage and networking capabilities. IaaS provides major cost savings to customers, as it provides access to additional computing capacity on demand, without the need for a major capital investment in additional hardware.
- Platform-as-a-service (PaaS): PaaS is a method by which an entire computing platform can be utilised remotely over the Internet via cloud computing. PaaS refers to a broad collection of application infrastructure, including operating systems, application platforms and database services. PaaS provides a way for customers to outsource their platform infrastructure needs and therefore avoid the need to purchase and implement a new platform. This service model typically allows cloud computing companies to charge customers only for the share of the resources they use, which is especially useful for a business that requires a specific application it would only use on occasion.
- Software-as-a-service (SaaS): SaaS is a software model that incorporates the delivery and management of a software application to a remote client via the Internet. SaaS relies on the centralised hosting of a software application that is typically accessed via a web browser application. SaaS can be configured to allow public access or private access, where only users with the proper credentials are granted access to a particular hosted software application.

Choice

240. Choice refers to the need to choose among alternative problem solutions. Cloud computing companies' choices span a range of on-demand computing resources for customers. Depending on the service, the choice may be entirely digital, such as the lease of computing power or the running of code on a remote server, or may involve physical steps, such as the transportation of data from a customer's location to a cloud computing company's facility for import to the cloud.

Execution

241. Execution activities are those associated with communicating, organising, and implementing the chosen solution. When a customer purchases a cloud computing service, it can select availability zones or allow the cloud computing company to choose availability zones for it. Customers may choose to be hosted in certain availability zones in order to be closer to their markets or to meet legal requirements.

242. Cloud computing services are generally centrally provided in one or a small number of jurisdictions within a wider region. Nonetheless, an important aspect of cloud computing customer service is modularity of operations. Availability zones are often connected to each other through a fibre-optic network, which allows the provider to ensure continuity of customer service in the event that computing power at one availability zone fails by automatically switching to another. Moreover, fail-safe connectivity may also be set up across regions. This implies that a given customer may rely on a multitude of availability zones within and/or across regions.

243. An important competitive advantage of cloud computing companies is the service that they provide to their customers. Key customer concerns are the security of their data and continuity of their processes, as in many instances customers rely crucially on cloud computing companies to provide services to their customers (e.g., Amazon Web Services provides Netflix's streaming ability).

Control and evaluation

244. Control and evaluation is the category of activities associated with measuring and evaluating the extent to which implementation has solved the initial problem.

245. Cloud computing companies also work with their customers to devise custom solutions to their business problems. Cloud computing companies ensure that they provide sufficient technical support to key customers. They also host webinars and conferences where technical experts provide insights into operations and new products. Finally, cloud computing companies often provide training programs, which further aid the development of technical skills necessary to use the company's services.

Technology

246. Cloud computing services are enabled by heavy investment in technology hardware and infrastructure, including machinery such as servers, networking equipment and electric power systems, in order to ensure sufficient technological capacity. In areas of particular operational sensitivity, cloud computing companies may choose to develop their infrastructure internally rather than procuring it from unrelated parties. Examples of internally-developed infrastructure technology and hardware include servers, network routers, custom-built silicon, custom storage server racks to store disk space and the programming of electrical gear.

247. Cloud computing companies depend upon their relationships with Internet service providers (ISPs), from whom they generally lease fibre-optic infrastructure from ISPs to connect its data centres. In addition, another key component of the technology is access to sufficient electrical power. Cloud computing data centres are huge consumers of electricity due to the immense energy required to power as well as to regulate the temperature (i.e., cool down) the servers. Cloud computing companies must also lease or purchase real estate in order to house their data centres.

248. Cloud computing services depend on the companies' maintenance of their global cloud infrastructures. As mentioned, the cloud infrastructure is often organised according to regions, where each region may in turn contain two or more availability zones. Availability zones consist of one or more discrete data centres from which cloud computing services are run. Services may be run by multiple data centres joined by fibre connections. For example, an application run in one data centre may draw on customer data stored in another.

249. Each availability zone is isolated, but availability zones within a region are connected. By connecting availability zones, cloud computing companies are able to offer resource backups, i.e., the storage of resources in multiple locations such that failure at one location can be overcome by switching to the resource stored in the backup location. This structure allows stability and continuity of service. Resources can also be replicated across regions to allow for even greater security.

250. Cloud computing services may vary by availability zone. Not all services are available at each. However, a customer's service selection is not limited by its geography; if a service offering is not available in a given region, it can simply select to rely on another. The consequence of relying upon cloud computing services in a location further from the location of final consumers is longer latency, i.e., a longer delay before a transfer of data begins after an instruction has been given. This is an important issue for example for video or music live streaming.

Notes

[1] Among the different views, some countries specifically consider that corporate profits represent the excess of sales revenue (price multiplied by quantum of sales) over the costs of their supply, and are a function of both demand and supply. Therefore, according to these countries, value created within the supply chain, representing the contribution of supply side, must be taken into account with the contribution of the demand for determining corporate profits attributable in a tax jurisdiction.

[2] For an overview of the earlier thinking on this issue see Varian et al. (2004) and Shy (2001, 2011); more recent contributions are collected in Peitz and Waldfogel (2012), Goldfarb et al. (2015) and Bauer and Latzer (2016).

[3] Non-rival goods may be consumed by one consumer without preventing simultaneous consumption by others. Most examples of non-rival goods are intangible.

[4] The literature on competition and regulation policy for digital markets has addressed many related issues such as market definition, mergers, exclusionary strategies and monopolisation (see Evans and Schmalensee, 2013; Evans, 2016; Filistrucchi et al., 2013; Kuchinke and Vidal, 2016). Many of the findings of these contributions have informed the analysis of this chapter as they shed important light on the features of digital markets. Nonetheless, to keep the analysis focused on tax policy, this chapter does not directly discuss competition issues which are instead discussed in OECD (2015b) and in the literature cited there.

[5] This approach allows Hagiu and Wright to link the relatively new literature on multi-sided markets to standard microeconomic theories of vertical integration, transaction costs and the boundaries of the firm going back to Coase (1937) and Williamson (1976). For a more recent summary, see Gibbons (2005).

[6] The business customer affiliated with the platform retains control of the inputs used to provide the service to the customers on the other side of the market. For example, the owner of an

apartment rented out through a platform will retain ownership and control of the apartment. The same is the case for a driver with respect to the car used to provide transport services.

[7] The business customer affiliated with the platform is responsible for any damage inflicted to the customers on the other side of the market. For example, the owner of an apartment rented out through a platform will be responsible for ensuring that the apartment remains in a habitable condition.

[8] See OECD (2014, forthcoming) for more detail and a discussion of related, non-tax policy implications.

[9] A long linked technology is a production process consisting of a fixed sequence of steps to transform standardised inputs into standardised outputs.

[10] Each primary activity can be divided into a number of distinct sub-activities. For example, for a pharmaceutical company, the primary activity operations can be divided into three distinct steps: (i) research aimed at the discovery of a new drug; (ii) clinical testing of a potential new drug and legal approval; and (iii) patenting and manufacturing.

[11] As previously noted, the distinction between traditional businesses and digitalised businesses is not always clearly defined. Businesses are best viewed as existing at some point along a spectrum that spans traditional, non-digitalised businesses through to the most highly digitalised businesses.

[12] Traditional advertisers were also concerned with efficiently interacting with the users on the other side of the market. For example, the success of the television advertising model was largely based on the size of audience; thus, substantial effort went into delivering attractive content.

[13] In some cases, however, the social network company may not automatically award advertising space to the advertiser offering the higher price, where there may be other considerations such as the impact of placing the particular advertisement on the quality of the user experience.

[14] Mass refers to a firms' physical presence in the location of the user or the customer's market.

[15] The one possible exception is cloud computing, where considerable physical infrastructure is required, although it is also clear that the increasing use of cloud computing services by other businesses is also a key driver of this process of dematerialisation.

[16] According to the WIPO, IP rights are granted either for industrial property or copyrights. While the latter includes authors' rights over literary or artistic creations, the former is subdivided into patents and utility models, industrial designs, trademarks, service marks, layout-designs of integrated circuits, commercial names and designations, geographical indications and protection against unfair competition.

[17] The authors use balance sheet data from Compustat covering US businesses from 1980 to 2012.

[18] The first category covers mainly business investments in computer software as captured by the National Income and Products Accounts tables (published by the US Bureau of Economic Analysis). The second category is based on two data series: The National Science Foundation's industrial research and development (R&D) expenditure series capturing scientific R&D in the traditional sense and the Census Bureau's Services Annual Survey (SAS) covering revenues from non-scientific commercial R&D devoted to product or process innovations. The third category covers economic competencies and is also based on two distinct components. On the one hand, it covers spending on strategic planning, product redesigning as well as investments in brand names; on the other hand, it accounts for investments in firm-specific human and structural resources. This information is sourced from the SAS as well as the US Bureau of Labour Statistics.

[19] In addition to productivity-enhancing effects, OECD (2015d) also discusses the positive effects that these processes can have on well-being and inclusive growth.

[20] Consumer surplus is defined as the difference between the total amount that consumers are willing and able to pay for a good or service (indicated by the demand curve) and the total amount that they actually do pay (i.e., the market price).

[21] Although, as the traditional taxi industry becomes increasingly digitalised, it is now increasingly common for traditional taxi companies to offer their service via an app.

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